INSTITUT FÜR BIBLIOTHEKS-UND INFORMATIONSWISSENSCHAFT
HUMBOLDT UNIVERSITÄT ZU BERLIN

Attitudes, habits, norms and policies regarding co-authorship among forest scientists in Brazil

Dissertation zur Erlangung des akademischen Grades
Doctor philosophae (PhD)

eingereicht an der Philosophischen Fakultät I
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Datum der Einreichung: 12/05/2016

Datum der Disputation: 25/07/2016

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To my dear daughter Selma Dora Kuhlmann Costa, source of unending inspiration and motivation for a such long and arduous work. And in memory of my grandmother, Dora Brum Sena, and of my mother Doris Brum Sena who were fundamental in supporting me during all the years of this research.

Acknowledgments

Some persons and institutions were fundamental to the success of the present research. I would like to acknowledge their importance here:

Prof. Dr. Michael Seadle – for his amazing patience and guidance during the elaboration of the entire work. Also for his calm and indispensable help with materials, insight and support, specially for allowing me to work for so long time in my own office, with the appropriate atmosphere for the development of a research work.

Prof. Dr. Victor A. Hoeflich – for his trust and support of my ideas and plans, to not mention his inspiration and guidance during the most difficult moments of the research work. His optimism and sense of humor were fundamental in keeping my motivation to accomplish such huge challenge.

Kathleen Dearden – for an insightful and detailed review of most part of the dissertation's text.

Boris Jacob – for his time and patience dedicated for intrincated discussions regarding the most complicated topics of this research, and of course for his German version of the abstract.

Prof. Dr. Elke Greifeneder – for her consideration in helping me many times with corrections and hints about the content I was producing.

Doris Brum Sena – for her support and love which made possible the completion of this endeavor.

Elmar Bones da Costa – for his optimism and inspiration during the most difficult moments.

Patricia Sorgenfrei – for her love, inspiration and confidence in my crazy ideas and initiatives.

Birthe Bretthauer – for the love, attention and trust dedicated to me. And also for the great help with the dissertation, specially at the very end of the work, including an amazing disposition to show me how to format a huge text like this.

Fernanda Scur – for her attention, insights and material related to my topic.

Heike Barbara Kuhlmann – for the persistent pressure to see me completing this huge work. To not mention her love and dedication in helping me to take care of our daughter while I was doing this investigation.

All my colleagues at the Berlin School of Library and Information Science for their time and good will in helping me with all issues regarding the dissertation.

All people at the Escola de Engenharia Florestal da Universidade Federal do Paraná who were so friendly to answer my 18 questions, apart from the amazing discussions and insights related to this investigation.

All persons who were around during the elaboration of this thesis, and that somehow helped with some inspiration.

Abstract

Attitudes, habits, norms and policies regarding co-authorship among forest scientists in Brazil

By Mariano Senna da Costa

> “The challenge of a writer is to find words that are better than the silence” (Jose Onetti)

In order to verify core issues for co-authorship in a specific audience, the current work focus on technological literacy, human interaction, and institutional policy. It first presents an interdisciplinary collection of arguments from social sciences, natural sciences, computer sciences, and humanities about scientific collaboration, specially regarding co-authorship activities.

This literature review includes statistics on information usage, description of knowledge management strategies, exploration of behavioral patterns, communication technology trends, and discussions of some historical, political and contextual elements that may be influencing the application of the Internet as a collaborative tool within academic contexts.

It also draws back few controversies about the concept of science and its practices, which are indirectly related to the problematic of scholarly communication, scientific collaboration and knowledge production. The investigation targets these activities in what they concern the production of co-authored texts.

A special focus of this work targets the current mainstream system of academic publishing ranking and evaluation (Bibliometrics or Scientometrics; QUALIS and SCIELO systems). The existing measurement system for the ranking of authors is generally an unfair/biased system, as statistics can easily be manipulated by a bureaucratic and corporate agenda, or by individual interests, rather than representing the real merit of an author.

The inquiry applies a semi-structured in-depth interview combined with a quantitative survey intending to reveal three interrelated aspects (Technological, Institutional and Cultural) involved in co-authorship activities

within the Graduate Program in Forest Engineering at the Federal University of Paraná/Brazil.

Its main goal is to provide information for a basic qualitative scrutiny of co-authorship activities in general. At the same time, the results aim to show how existing platforms might help to improve networks performance and information quality. Finally, the entire work points out ideas and issues that are demanding further studies, specially regarding communication at academic environments. Among the most challenging aspects, the context of academic work offers a very intriguing perspective to be examined in the future.

Zusammenfassung

Attitudes, habits, norms and policies regarding co-authorship among forest scientists in Brazil

Von Mariano Senna da Costa

> "Die Herausforderung eines Schriftstellers ist es, Wörter zu finden, die besser sind als die Stille" (Jose Onetti)

Um Kernfragen zur Mehrautorenschaft in einer bestimmten Zielgruppe zu klären, konzentriert sich diese Arbeit auf Aspekte von technologischer Kompetenz, menschlicher Interaktion und institutioneller Leitlinien. Zuerst werden interdisziplinäre Argumente in Bezug zu Mehrautorenschaft aus den Sozialwissenschaften, Naturwissenschaften, Informatik und Geisteswissenschaften präsentiert.

Die Literaturübersicht enthält Statistiken zu Informationsnutzung, Beschreibung von Strategien des Wissensmanagements, Erforschung von Verhaltensmustern und Trends in der Kommunikationstechnologie, sowie Diskussionen einiger historischer, politischer und inhaltlicher Aspekte, welche die Anwendung des Internet als kollaboratives Werkzeug im akademischen Kontext beeinflussen können.

Die Arbeit beschäftigt sich auch mit einigen Kontroversen zur Konzeption von Wissenschaft und wissenschaftlicher Praktiken, welche indirekt mit der Problematik von wissenschaftlicher Kommunikation und Zusammenarbeit, sowie Wissensproduktion in Zusammenhang stehen, insofern sie die Produktion Texten mit mehreren Autoren betreffen.

Ein besonderer Schwerpunkt der Arbeit befasst sich mir dem zur Zeit vorherrschenden System zur Evaluation akademischer Publikationen (Bibliometrie oder Scientometrie; QUALIS und SCIELO Systeme). Das vorhandene System für die Evaluation von Autoren ist in der Regel unfair /voreingenommen. Das liegt daran, das Statistiken leicht manipuliert werden können um einer bürokratischen und unternehmerischen Agenda zu folgen oder individuelle Interessen darzustellen, anstatt die wirklichen Verdienste eines Autors widerzuspiegeln.

Die Untersuchung wurde anhand von semi-strukturierten Interviews durchgeführt, in Kombination mit einer quantitativen Erhebung, welche drei miteinander verbundene Aspekte (technologische, institutionelle und kulturelle), die bei der in Mehrautorenschaft eine Rolle spielen, innerhalb des Graduiertenprogramms in 'Forest Engineering' an der Universidade Federal do Paraná (Brasilien) hervorheben sollte.

Hauptziel der Arbeit ist es, Informationen für grundlegende qualitative Prüfung von Mehrautorenschaft zu geben. Gleichzeitig zielen die Ergebnisse darauf ab zu zeigen, wie bestehende Plattformen helfen können, die Leistung und Qualität der Informationen in Netzwerken zu verbessern. Schließlich verweist die Arbeit auf Ideen und Fragen, die in weitere Studien zur Kommunikation in akademischen Umgebungen verwendet und untersucht werden sollten. Der Kontext in dem wissenschaftlich gearbeitet wird ist dabei wohl einer der interessantesten Untersuchungsgegenstände.

Keywords

academic activities, academic capitalism, academic communication, academic social network, bibliometrics, collaboratory, co-authorship, collective writing, co-publication, cyberscience, e-science, formal education, information empires, information management, institutional contexts, knowledge monopolies, networking processes, open access, open science, philosophy of science, power structures, publishing culture, quality in research, scholar system, scientific collaboration, scientific networks, scientific publishing, scientific openness, virtual research environment, wikitopia

Focus of Interest

Scientific collaboration; Co-authorship of scientific texts and works; Expert knowledge production; Interests and motivations of academics; Publishing culture at graduate forestry schools

Preface – The idea of this research

This research is a result of continuous and systematic investigation of collaborative practices in science over the last ten years, which started through the elaboration of my master thesis (Scientific information on environmental issues in the age of digital media, ISNM – Lübeck Universität / 2004 – 2006).

By that time, I had worked as a journalist covering environmental topics for over 12 years, and the lack of answers to many of the problems on which I was writing puzzled me. How could science (and the scientific community) be powerless to advise society on different issues facing the world? Climate change, nuclear energy, waste management, the over exploitation of resources and consumerism were some of the problems with which I followed

in journalism. However, I could not understand why scientists' conclusions about these topics did not result in action by the public.

For my master's thesis, which I defended in October 2006, the Central Research Question (CRQ) was: Can wiki systems improve processes of information production and management at academic and scientific institutions? And if yes, then why has the usage of wikis in scientific environments not being effective until now? Driving this research was my personal interest in the long and impenitent resistance of academics to engage in projects like Wikipedia. As a professional in communications, I was concerned with understanding how scientific institutions could act in order to support the application of collaborative tools for information production and distribution. The main hypothesis was that the answer lies in a mix of cultural, institutional and technological factors. The research investigation focused on internal processes of communication of scientific institutions working on environmental issues, and from this point of view, on how scientists work when publishing papers and scientific information.

The target group was composed of 52 technicians, students, professors and researchers of the Zentrum für Agrarlandschaftsforschung (ZALF - www.zalf.de) located in Münchenberg, Brandenburg, Germany. At that time, ZALF had 270 employees, including senior and junior fellows, PhD students, technicians and administrative staff. In 2005, the Center had published fifty seven peer-reviewed and fifty three non-peer-reviewed papers in scientific journals, made more than one hundred contributions to collected editions, and produced twenty two monographs, but only seventeen electronic articles.

The respondents answered a survey with twelve quantitative questions intended to identify behavioral patterns and motivations for using certain tools and procedures to share scientific information. In parallel, there were ten in-depth interviews carred-out with experts in technology, collaborative systems and environmental issues. These interviews were fundamental for clarifying aspects uncovered by the quantitative survey such as the social trend of using digital technology to share expert information, and the creation of different procedures to manage knowledge.

With a similar methodology applied in the present work, I found that the “technological revolution”, represented by the advent of the Internet, could not be responsible for the communicative inabilities of the academic establishment. Indeed, I saw that scientists were not using the most modern tools for communication because of certain habits and institutional norms verified in their context, or what some theorists refer to as a “subculture”. To summarize in a few words, I found that cultural and institutional issues primarily influence academic communication, rather than technological literacy.

Among other findings in my master's thesis, I shall also mention the weaknesses of quantitative networking analysis (Newman, 2000) for describing, and understanding the behavior of academics when working together. While on the one hand, this theoretical approach provided a nice graphic face to look at interactions during the elaboration of a co-authored work, it missed the deeper and more complex point of analyzing the motivations and interests of scientists when collaborating.

In general, many questions with which I started the project remained unanswered. The most significant was: Why was a research center, like ZALF, not yet systematically using an open-access system to publish the information being produced by its scientists? Why was its staff communicating in rather closed, clustered, and competitive pattern? These questions were further motivated by those from Foster et all. (2007) regarding an imense lack of knowledge about the reasons and practices of writing and publishing papers (“how papers happen?”, pg. 06).

Moving forward, the history of modern science and media, and particularly around its political and ideological development, gave several insights regarding scientific collaboration, publishing culture and changes promoted by the new media advent (Adorno & Horkheimer, 1944 / Innis, 1951 / Kuhn, 1962 / Foucault, 1969 / Piaget, 1971 / Feyerabend, 1975 / McGinn, 1991 / Postman, 1992).

Since the hypothesis of the works by these scientists could not be verified by the conclusion of the research undertaken in my master, I assumed that

further studies would be fundamental to prove, or to disprove a general bias in communication procedures at academic contexts, especially those dedicated to controversial environmental issues.

In summary, I was interested in further exploring the “communication universe” of scientists. Why are researchers and professors, for example, not yet working with more effective and transparent tools like wikis, weblogs or social bookmarking sites? How could they be motivated to improve their record of collaboration using digital platforms?

With these questions in mind, I conducted an exploratory search, and tried to map what was happening in the academic world. I chose to study publishing and co-authoring activities as a site of communication and collaboration within academia, and specifically, how they concern academics, universities and publishing houses perspectives.

The references and information that led to the research at hand reveal a sequence of happenings that did not automatically result in the ideal research plan. To a great extent, fundamental meetings and findings from this process happened “spontaneously”, "by chance", "coincidentally", or "luckily". The investigation involved complex and unfinished discussions, including commercial interests in science (private science), academic ethics, and the urgency for a new set of social norms to support pure scientific endeavors, instead of primarily economic or political interests first.

Alongside the concrete data collected, there was one question that was present in the background of my work most of this time: why is it so important to think about the effects of technology? My problem is not about the answer I am supposed to have, but the fact that in most of the academic contexts I have found myself, this question is either absent or undesirable.

I found ways of approaching this issue by looking back to the consequences of previous technological revolutions (e.g. the industrial revolution), which justified and tremendously increased ecological destruction, ignoring our symbiotic condition with the planet (Dechert, 1970).

It is also important to see that technological and scientific advancements have stimulated the corporate system, promoting business' interests over that of

society. The prevalent solutions, or retifying measures, to this situation are normally the creation of a state organism or commission, responsible for managing problems, but with no effective way of solving them (i.e. through bureaucratization). The problems of ecological degradation are a good example of such a trend (McGinn, 1991).

Thus, the need for a new approach to scientific collaboration does not come from failures in the current traditional forms of communication used in academia. Instead, it is motivated by major challenges we face nowadays, or from "the forces at work today" (Joyce, 2010). Among them are:

- Globalization ruled by transnational corporations
- Climate change inaction
- Wars and nuclear threats post-cold war
- Ecological degradation
- Social and cultural changes with no sustainable path

These issues refer to a need of a "social-system change", including in the forms in which our most intelligent people communicate. It is not a matter of what kind of society we want anymore; it is "a matter of survival" (Magdoff and Foster, March/2010).

Conflicts and controversies in different areas of knowledge serve as practical examples of the current "bias of science". Some of them are listed below, together with significant literature on each topic:

- **Intellectual Property** = Free Culture (Lawrence Lessig, 2004)
- **Climate Change** = The Revenge of Gaia (James Lovelock, 2006)
- **Genetic Engineering** = Science and the Corporate Agenda (Chris Langley and Stuart Parkinson, 2009)
- **Economics** = Prosperity Without Growth (Tim Jackson, 2009)
- **Health Sciences** = Asbestos, a scientific manipulation (Fernanda Giannasi, 2006)
- **Forestry** = Rainforest treaty 'fatally flawed' (Michael McCarthy, 2009)

The idea is to be aware of the impacts from technological shifts in order to avoid being one of its victims (Rhodes, 1986). This is the main intention behind the present research.

1. General Presentation

1.1 Introduction

Scholarly communication is the heart of scientific endeavor. The German sociologist, Niklas Luhman, considered science a particular form of communication, seeking exclusively to confront falsity with truth (in Segersträle, 2000). Other philosophers of science saw basically a collective effort in it (Popper, 2003), with collaborative communication representing an ideal approach to activities that are fundamental to its progress (Postman, 1996, Van Reenen, 2006, Kierkegaard & Adrian, 2010, Martins Moraes, 2014).

With regard to the above, writing and publishing encapsulate practically all other kinds of communication acts of a researcher or a professor (searching for information, data gathering and management, methodology elaboration and review, topic discussion etc). Michael Nentwich summarized very well the relation among communication, publishing and science:

> "Publications can be defined as the products of scholarly communication. However, even knowledge production involves a good deal of communication, namely communication with the object of science... To a very large degree, science and research is communication." (Nentwich, 2003 - p.31)

It is still widely accepted that publishing papers in journals represents a major form to certify, convene and curate scientific knowledge. Furthermore, since the appearence of first journals in England during the second half of the XVII century, they maintained an image of an ideal way of preserving and communicating research work. However, accumulating evidence shows that such a status has already changed. And the new communication paradigm brought about by the Internet is the main factor to blame (Fecher, 2014 / Davis, 2014).

The report “Cyberscience – Research in the era of the Internet” (Nentwich, 2003) serves here as a theoretical benchmark in regard to predicted changes. It foresees changes on different levels and scales. According to it, the main kinds of impacts caused on sientific research by the advent of the Internet are:

- Changes on Communication System (Partners, Media and Properties / Functions);
- Changes on Academic Structure (Actors, Processes and Products);

– Changes on Research Substance (Methodology, Work Modes and Representation).
(Nentwich, 2003 – p. 52 to 63)

Different activities (e.g.: referencing, co-authoring, reviewing, networking, supporting) have changed in their structure and scope, but specially in what they concern the new possibilities given by current Information and Communication Technologies (ICT). These possibilities are promoting more open, informal and interactive ways to make scientific works available to the public (Olson et al. 2008).

The present work intends to shed light over recent transformations affecting academic communication. It focus on collaboration and the current publishing culture in front of innovations happening in the communication technology. The special interest is the production of co-authored texts, since this mode of publishing is considered an ideal proxy of collaborative activities in science and research (Gomes de Souza & Azevedo Ferreira, 2012).

Opportunities and threats

The recent development of ICTs is facilitating unprecedented contacts, interaction and sharing among scientists all over the world. This is one of the key factors prompting, not only the usual co-authorship or knowledge exchange, but a more inter-institutional and interdisciplinary scientific collaboration (Olson et al., 2008). In other words, co-authorship is not only growing in number of papers and authors, there is a core transformation in form, context and significance undergoing the process of collective content production (Bhat 2009).

Currently, it's still widely accepted that information exchange and knowledge production happen according to institutional norms and individual interests. Besides the "publish or perish" culture, academic environments are pervaded by a context where individual achievement and success is practically the only way to assess research work. Theoretically, competition has become a vector to scientific efficiency and productivity (Fanelli 2010).

Some indicators that confirm such a pattern are:

– Universities' rankings
– Journals' impact indexes
– Authors' productivity indicators.

But this pattern is also changing with the introduction of new possibilities offered by recent developments on communication technology (Yao et al. 2009). How exactly is this cultural change occurring, which effects is it already showing, and more importantly, what will be the result of it, specially for the traditional structures of society? These are core questions yet to be answered.

Regarding scientific publishing, and therefore the authorship of scholar texts, recent studies confirm that we are experiencing a kind of "path dependence", or "lock-in phase" phenomena. In comparison to technological advancements, traditional procedures and structures of the scientific establishment are left far behind. Today, libraries are not the most public way to store documents and texts, journals are not the most efficient way to share knowledge, and peer review is only an outdated form to ensure content quality (Fecher, 2014).

While there were quite important advances like the implementation and development of scientometrics, the structures and processes involved in the production and distribution of knowledge through the publication of articles are posing a fierce resistance against possible improvements. Evidence of an increasing "cognitive challenge" from the "impact gamesmaship" that characterize current assessment and review systems of journals is dauting (Davis, 2014 – p. 193).

Gerald Davis (2014) compiled the main issues concerning our current publishing system in an editorial essay to the Administrative Science Quarterly journal. Urging for dialogue in order to connect goals of science with the system of incentive embedded in publishing activities, he also addressed the hurdle of quality in science. The issues he pointed out are:

- Slow and very bureaucratic review process;
- Greedy postures/interests of publishers;
- Ranking systems put quantity over quality (indeed, there is an absence of really qualitative means to assess scientific work);
- Elitism promoted by best ranked journals;
- Outdated formats of traditional journals (e.g.: nr. of articles, fixed text lengths, regular intervals of publication)
- Access to content is normally hidden behind a paywall

But the most significant demonstration of a systemic flaw is the fact that although these problems, authors, editors and publishers are still dedicating a lot of energy to keep this system going. It is clear that the publishing ecosystem shapes the incentive forms functioning, and vice-versa. Thus, how to escape this dead-lock? Finding the roots of mechanisms promoting anomalies is only the first step.

Indexes of productivity and impact of research are key factors to this issue. They are currently the most important indicators for institutional and career evaluation. Institutions all over the world apply these quantitative measurements to judge academic performance and decide about the allocation of resources and infra-structure. The relation between systemic flaws and indexes is summarized as follow, by Davis (2014):

> “When professors are assessed for tenure on the basis of counts of articles in particular high-status journals, it creates incentives for bad scientific practice". (p.: 194)

A deeper explanation for the current pathologies of this ranking system could also consider the very nature of quantitative assessment, or the ideology behind it. It is definitely not a system fomenting transparency. Furthermore, it is a tool pushing for competitiveness in a self-reinforced manner. An already well known element influencing scientists to pursue their own career interests in detriment of the pure scientific ideals (Fanelli, 2010 / Martins Moraes, 2014).

Value and quality

Nowadays it is common sense to relate value and quality in scientific activities to the concept of excellence. Again, it is a competitive matter, evidenced by the increasing pressure for publishing in order to attend the demand presented by universities' rankings. The main parameter for work performance, and therefore a decisive factor for resources allocation, career promotion and tenure. International standards lead such trends, which are promoting a quantitative flatness of very different areas of knowledge and traditions of academic work. In some cases this appears as an inflationary co-authorship phenomenon (Persson, Glänzel, & Danell, 2014).

The main goal of the indexes is to provide objective measurements of the often intangible work of scientists (Foster et al., 2007 / Abramo, D’Angelo, & Rosati, 2013). Which in many cases subvert the real value of abstract things like insight, creativity, innovation (Postman, 1996 / Raymond, 2001 / Laszlo, 2004 / Goswami & Laitman,

2010 / Hon, 2011). And all this, in most cases, is done only in order to attend the necessity to support decision making processes at funding agencies, or the “structural constraints” of our academic institutions (Maniates, 2003 - p. 30).

There is also one fact that seems ignored in this discussion. It is the acknowledged fragility of any quantitative or statistical measurement as a tool to assess quality (Kyvik, 2010). Metrics can always be manipulated in order to represent desired results. Recent cases of “citation stacking” are a good proof of it (Van Noorden, 2013). Direct human interaction is much more challenging. While difficult to define and judge, it is still a better way to infer and promote work quality (Young, Ioannidis, & Al-Ubaydli, 2008 / Laniado & Tasso, 2011). “Wisdom of the crowd” is among the terms recently coined to refer to this kind of approach (Falconer & Noy, 2011 – p. 43).

The globalization process is also contributing to shape the current notion of quality in science. But above all, it is the increasing need of academic institutions to “be accountable” that is driving a legitimate obsession for performance and effectiveness in higher education. A very dangerous argument for the purpose of education itself (Czellar & Lanarès, 2013 - p. 1006).

Czellar & Lanarès (2013) made an excellent analysis of the possible parameters to assess quality. Among them are clarity, originality, significance, methodology, feasibility. The last one, for instance, depending on how it would apply, could ended up hindering innovation and discovery, since it refers the possibility of what is yet nonexistent. The authors admitted that this kind of framework would vary according to each discipline. However, they highlighted the current lack of a clear definition of research quality.

Google Open Alternative

If we are still lacking alternatives for measuring quality, an initial step out of the vicious cycle of quantification would be a more open, and henceforth transparent approach to communication (Grand, Wilkinson, Bultitude, & Winfield, 2010 / Schekman, 2013). This refers to a new “knowledge ecosystem”, in which academics embrace the principle of sharing their work output without any expectation or compromise with making profit, or pecuniary reward. The only compensation for such altruistic attitude would be their recognition as a source of the given material.

Furthermore, while adopting collaboration as an exclusive ideology, scholars would move from the current single authorship paradigm towards a community, or collective authorship paradigm (Baraniuk, 2006).

Open Access movement has been proposing such transformation for decades now (Van Reenen, 2006). It's been supported by tools and projects such as Google Scholar and Google Drive. The first has already become the default literature portal for younger scholars since its launch in 2004. While Google Drive and other tools for collective writing and content production might help in the efforts for transparency in content elaboration (Davis, 2014).

Among the challenges for the Google Scholar yet to be solved, there is the issue of credibility of its indexes and sources. This is related to the fact that indicators of productivity and impact are the main form to assess academic performance, serving as parameter to define the application of resources and career promotion. Publications are an obvious output of researches. They are evaluated according to productivity (number of publications) and impact (citations). This regards to the cumulative character of scientific progress, but it is an institutional matter as well, regulated mostly by governmental agencies at a national or international level. And Google is a private company, perceived as an alien in such a context (Murakami, Fausto, and Ferreira de Araújo 2014).

Promoting transparency

Other product of Google is Google Drive. It allows public sharing of tables and data in a raw form, and in a dynamic manner, facilitating the scrutiny of methods and analysis applied. The task of exploring and validating the given data turns out to be friendlier. Promoting a more collaborative form of dealing with data and information. In general, such projects have a potential to become real alternatives, specially in areas of social sciences and humanities in non-English countries, like Brazil. They are complementing each other (Google Scholar and Drive, Refine), following the premises of Open Science. And specially reducing the dependency of commercial and restrictive sources of information and tools.

In Brazil, the country chosen for the present study, open systems like Google Scholar permit the search and retrieval of scientific articles citations, signalizing an alternative to the studies about the impact of scientific production, specially from

social sciences and humanities. Among its advantages it is important to highlight: it is free, offers a wide coverage including social sciences and humanities, and for other kinds of materials like books, chapters of publications, reports and documents of events. And more importantly, it works on collections of documents in other languages than English, including those of developing countries. In summary, tools like Google Scholar, as other Open Access tools, are believed to render scientific research more transparent, which is also attributed to produce increased collaboration. This is a core demand for the institutional work of assessing research in order to manage resources and projects (Murakami, Fausto, & Ferreira de Araújo, 2014).

Above all, for the present dissertation the interest goes beyond current procedures, structures of academic publishing. It tries to see the effects of technology in the ways researchers and experts write texts. And how institutional norms and policies could support innovation and improvements regarding it. Ideology seems, at first sight, to be at the bottom of all structures that exist. Therefore, the investigation here considers three contextual aspects impacting collaborative publishing:

- Technological
- Institutional
- Cultural

In order to explore these three aspects one main question, supported by four secondary questions, was elaborated. They were applied to a specific audience, framing a case study about how scientists are producing co-authored papers. The questions were:

Central Research Question

– What attitudes, habits, norms and policies verified in the Graduate Program of Forest Engineering at the Federal University of Paraná / Brazil discourage the application of online tools, like Google Docs, for co-authoring purposes?

Derivative questions

– How does the target group usually apply online tools for academic communication / collaboration / co-authorship?

– What are the main motivations of these academics in writing an article collectively? Do they perceive any clear advantage (individual, institutional and/or social) in co-authored publication?
– Are there institutional norms and policies at the mentioned academic environment promoting the application of online tools, like Google Docs, for co-authoring purposes?
– How do they relate to topics like information secrecy / privacy, content accessibility, administration transparency, credibility?

2. Methodological Scope

> "The danger in brand-labeling schools of thought is that we rarely go back to the original texts to discover the riches that are not captured by the summaries." (Mary Catherine Bateson, in “Steps to an Ecology of Mind”, The University of Chicago Press, 2000 - xii)

Collaboration in science has been a matter of study for decades now. Some authors already claimed an urgent need to consolidate the empiric knowledge related to collaborative networks already available. This would lead to "a more sustainable development on this area" (Camarinha-Matos and Hamideh 2005, p. 439). They defend, among other measurements, the establishment of a new scientific discipline: collaborative networks.

The work of Marc Newman (2000-2004) on statistical and graphical representation of scientific networks is a classic in that topic. The vast majority of research works since then pursued this goal of exploring the quantitative characteristics of collaboration in fields like Physics, Mathematics, Computer, Medical and Social Sciences etc.

Social sciences, for instance, apply at great extent quantitative assessments to define, describe or measure collaboration. Focusing specially the "economics of science", they use mainly bibliometrics, scientometrics, and game theory methods, what can be seen as experimental attempts of representing the complexity of collaborative interactions among researchers and research projects (Dempsey, 2010).

The rise of new disciplines such as Bibliometrics / Scientometrics is a demonstration of such tendency towards quantification of academic performance. Techniques like the Social Network Analysis (SNA) are based on the analysis of bibliometric indexes. They generate formal assessment tools like the Social Sciences Citation Index (SSCI), which use the following metrics:

- density
- connectedness
- fragmentation
- clustering coefficient
- centralization - (degree, betweenness and closeness centrality)
- components
- mean distance
- diameter
- productivity

– collaboration
– citation measures.
(Hanneman & Shelton, 2010)

Although very sophisticated, these metrics are loose, inaccurate or inappropriate to express and represent concepts like “structure” or “cohesion” . In that regard, co-authorship network properties, such “cluster”, “scale”, “distance” and “diameter”, does not help to understand the relationship's dynamic among academics. Indeed, looking only the quantitative results given by network metrics we may easily misinterpret the real picture of research work (Kyvik, 2010 / Liang & Zhong, 2013).

In other words, it is to say that to find a group of researchers strategically positioned in the collaboration network due to productivity, does not help to understand the mechanisms which result in that centrality, much less the impacts of this clustered structure to society and to the scientific establishment itself (Laniado & Tasso, 2011).

A good example of the current limitations of quantitative methods is given by Hanneman and Shelton (2010). They explain the notions of “events” and “organizations” as social things, with attributes and agency. Thus, a research article might be treated as an “event”, with its attributes (length, topic, co-authors, citations, etc.), name, and a “social life” of its own, that is not reducible to the attributes of its producers. This serves as example of the difficulties to contextualize products according to their producers, instead of simply considering them (events and organizations) as separated things.

Similarly fragile are the attempts to understand “relations” among persons through analogies used to describe databases structures. At the end, the resulting “social structures” or “patterns of social relations” leave out important aspects of collaborative behavior like the role of institutional context (group identity & policy), or the subtle influence of cultural background (social construction). In other words, in order to understand how and why collaboration happens, it is not enough to study the so called “digitally mediated interactions”.

And collaboration between social and information sciences is just the first step towards that direction. The lack of a consensual framework to classify distinct types of social relations is a demonstration of how far we are still from such target (Hanneman and Shelton 2010).

Another example can be found on issues concerning misbehavior of academics when writing papers. Accuracy problems on referencing are one of the most frequent, though not simple of being found neither understood only by looking into any bibliometric data (Liang & Zhong, 2013).

Despite the improvements for the evaluation and ranking of educational institutions, it is still a matter of concern for the academic community that we are lacking a well established qualitative framework to evaluate the diverse activities comprised in the contemporary concept of scientific collaboration (Nentwich, 2003 ; Laniado & Tasso, 2011).

2.1. Co-authorship

> "...it is a part of the task of the social scientist to test the limits of his tools and to indicate their possibilities, particularly at a period when he is tempted to discard them entirely". (Harold A. Innis, The Bias of Communication - xxvii, 1951)

Co-authorship is one of these diverse activities forming the set of what we formally know as scientific collaboration. From a quantitative perspective, it is widely accepted to measure it through the name of authors presented in a paper. In a similar logic, the relevance of articles is been assessed by the number of citations received in mainstream media of the academic establishment.

However, even whether these forms of assessment have been widely adopted, they themselves do not grasp a clear definition of collaboration and of work quality. In other words, the number of authors in a paper isn't an appropriate parameter for a good collaboration in writing an article. Neither citation index does necessarily represents a trustful grade to evaluate the importance of a paper to scientific progress.

Recent papers on the topic are categorical: we are still do not knowing how scientific texts are produced (Foster et al., 2007). Trivial questions are still unanswered, like: What are the behaviors, interests and motivations behind this activity? This is a starting doubt for the present research, trying to understand the ongoing transformation of the entire expert publishing culture (Maniates, 2003 / Rubí-Barceló, 2008 / Fanelli, 2010 / Bollier, 2011).

Very few qualitative studies about co-authorship can be found in the mainstream of international library and information science. This may be an effect of the so called

bias of “a positivist image of science” (Forsythe, 1999 – p.: 137). Due its origins, it is still a topic prevailingly investigated by physicists, mathematicians, and computer scientists. And they apply predominantly quantitative methods of research in their scientific inquiries.

Some are trying to mix qualitative and quantitative methods, or to use interdisciplinary analysis to understand how academics usually apply online tools for collaborative purposes, and what are the core factors influencing their activities in academic contexts (Sonnenwald, Whitton, & Maglaughlin, 2003 / Olson, Bos, & Zimmerman, 2008 / Abramo, D’Angelo, & Rosati, 2013).

This trend seems to ignore the fact that collaboration is an interdisciplinary topic by its nature. All disciplines pursuing a scientific explanation about the collaborative phenomena are applying their respective methods and theory, but rarely seeking the interconnections between different field studies (Shrum, Genuth, & Chompalov, 2007 / Rodriguez & Pepe, 2008 / Menand, 2010).

Technological aspects

Regarding technological factors, the study of Michael Nentwich (2003) has been taken as benchmark, with some crucial approach's differences. I chose to focus in one specific audience (a single institution), related to one specific discipline (forestry) instead of a broader target group related to several different disciplines.

Also differently than Nentwich, I did not focus in technology assessment. My quest was driven by an interest in understanding the factors behind some already known phenomena of technology usage (why collective writing tools are still underutilized or ignored?). It is to say, that the challenge here is to see what are the cultural and institutional issues influencing the target group while collaborating, specially co-authoring and publishing papers with other fellows.

It may be interesting to comment few weaknesses of Nentwich’s investigation (2003). He prepared a framework to analyze the impact of networked computer technology, specially the Internet (Cyberscience) on scholarly activities. In his graphic (p.24) with the main definitions and framework of academic activities, there are four main categories (Institutional Settings, Knowledge Production, Communication and Distribution of knowledge).

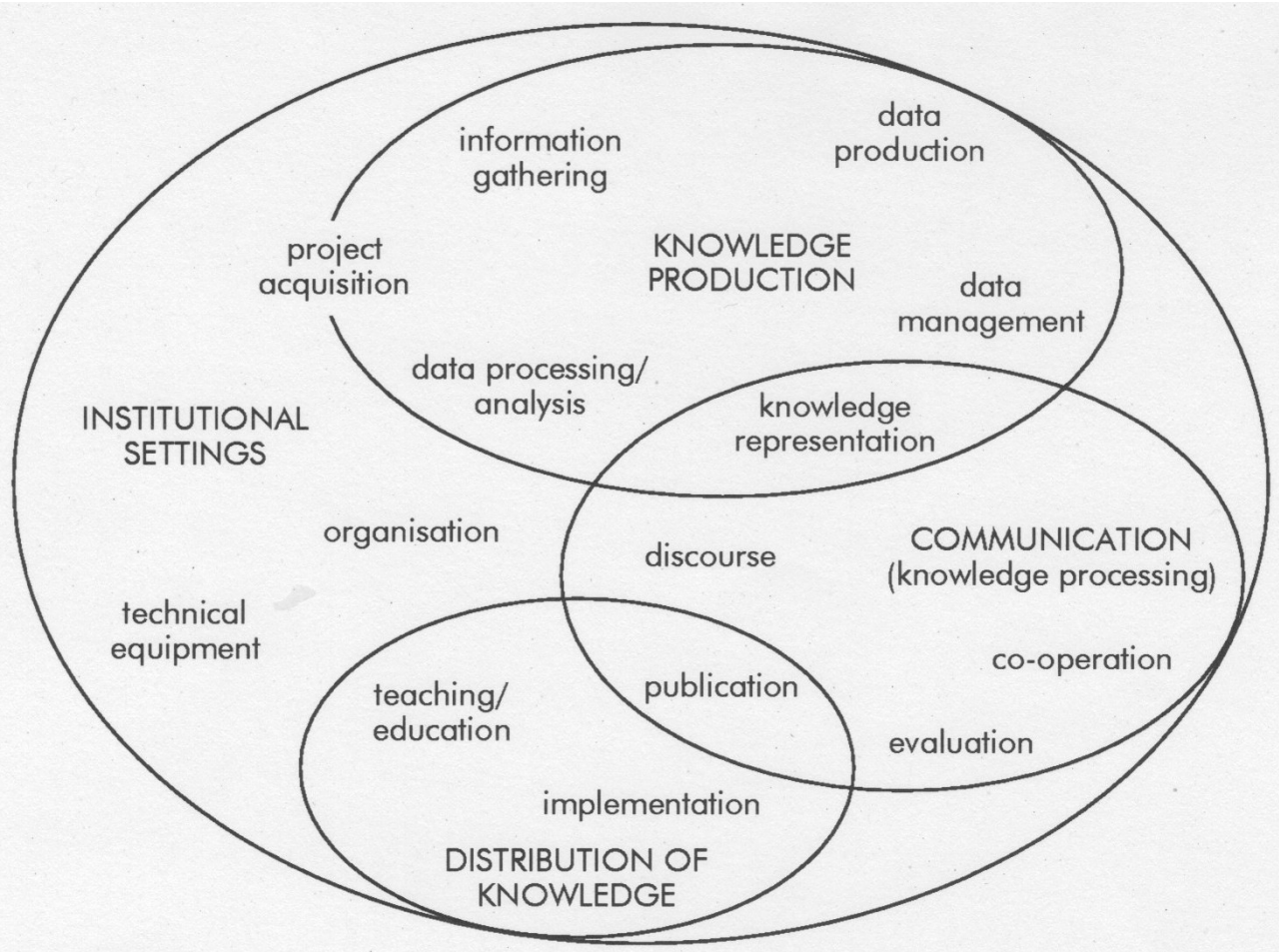

Figure 1 – Academic activities and framework (Nentwich, 2003)

While he separated and classified these in order to facilitate the scrutiny of factors influencing the adoption of new tools and processes, it is important to assert that in fact these activities are interdependent and co-related. More, in many cases they overlap each other, specially when applying digital media. Thus, it is difficult to define clear lines of separation. Or, they must always be arbitrary determined.

On the other hand, Nentwich's investigation (2003) showed already the extension of the institutional settings influence. Indeed, other activities and categories rely fundamentally on institutional, therefore political framework.

Institutional aspects

In order to track, classify and evaluate these patterns of expert communication, it is important to find and adapt compatible methods that are appropriate to deal with complex issues. Among the complexities highlighted by Abbott (1999), there are

those from institutional settings, like the "intellectual rivalry" and "faculty politics", affecting deeply the communication process at scholarly environments.

Insisting that social life is defined according its location (time and place), he presents the academic life as a sequence of events dynamically interconnected among each other, and not as static entities. Furthermore, in the book “Department & Discipline” (Chicago, 1999), Andrew Abbott refers to the modern scholarly publishing system as a “virgin soil”, lacking investigations regarding its structures.

In another book Andrew Abbott (2001) approached the inconsistencies of social sciences methods within a time perspective. Regarding methodological differences, the prominent professor of the Department of Sociology at the University of Chicago gives interesting examples on how the academic treatment can really challenge the willingness of a scientist:

> "My qualitative friends, as yet unleavened by the historical and cultural yeasts of the mid-1980s, politely told me it was interesting and why didn't I do something real - something Marxist, for example? (five years or so later they were telling me that I ought to get interested in narrative). My quantitative friends mostly told me to shut up. If I didn't have anything better to suggest, I should stop yelling at them" (Time Matters: on theory and method, 2001, p. 06)

Considering himself as a "sociologist of professions" (p.07), Abbott (2001) recognized a basic problem in the relation between history and sociology. He called it a philosophical problem, but admitted he had difficulty to convince other colleagues that it was somehow a problem. It is also mentioned as "transcending general linear reality" (p.10). Which is specially difficult to approach if the matter involves a change of paradigms.

In the present case I am not referring to paradigms' differences among academic disciplines. The investigation here intend to understand a new technological paradigm, causing transformations on social, political and economic relations in all disciplines of the scholar life. According to Abbott yet, the biggest challenge is to deal with the transformation happening on ontological and metaphysical assumptions.

In that regard, Abbott warned about the traps of standard methods. One of them regards the quantitative method that treats “social entities” as fixed unities. But he also argued against the problematization of “gender” and “bureaucracy” as things that may have their own reality, merely because we measure their effects (p.12).

Among the alternatives suggested, there are the methods that let variables have several meanings at the same time. And they have been underdeveloped by now. As he asserts:

> "...there were issues that neither side (practitioners of quantitative and qualitative social science methods) wanted carefully analyzed" (Abbott, 2001 – p. 282).

Abbott's contribution to the social sciences is most known as a retake of the real procedures of sociological investigation, instead of a quest for fixed and structured methods of scientific research. In his "autobiographical introduction", Andrew Abbott admits that he had no core method, but "pursued at least three lines of research at once", putting the "philosophical argument" upon the methodological approach (2001, p. 02).

Ethnological approach

The research of the present dissertation is empirical, mixing in-depth interviews with a quantitative survey, observations and field notes. Readings of academic history in Brazil and of current legislation regarding graduate education, were cross-checked with the observations made by the interviewees, aiming to define, as clear as possible, technological (e.g. literacy), institutional (e.g. policy) and cultural (e.g. individual expectations, interests, values) aspects that are influencing collaborative work in science at the selected environment.

The academic culture is the most challenging component for the investigation of co-authorship's practices of forest scientists in Brazil. Therefore, I decided to apply ethnography in order to unveil and describe the background ideology of this sub-culture. More specifically, I was interested in revealing "tacit orthodoxies" (Forsythe, 1999 – p. 143), what also includes shared values and beliefs of this group of academics. But before identifying stable patterns, the work here intends to understand why the publishing culture functions like it currently does. The survey's results were used here to support the analysis of the specific context, and vice-verse, in relation to processes and settings of academic publishing and co-authorship activities.

From the methodological perspective the present investigation applies an empirical ethnographic approach, or a collaborative ethnography method (Lassiter, 2005), where the subjects (interviewees) were active in understanding my focus of research

throughout recorded face-to-face interviews, while willingly giving me their perspectives on the issues I was interested in.

The questionnaire I elaborated for over 2 years intended to unveil the tools for collaboration applied by the researched audience; their reasons for choosing the tools; the influence of institutional settings on these habits of usage, and the characteristics of collaborative activities in the elected context. Furthermore, through a detailed and structured discussion it was possible to explore possible reasons and causes for the problems verified, and to point out possible solutions for them.

The application of the questionnaire involved proper epistemological and methodological standards in conduction of the fieldwork (Forsythe, 1999). The pre-established order and formulation of the questions, as much as the observations and data analysis processes were adjusted accordingly to the situations faced. And as an expert outsider, I could infer their answers while interacting with them in order to improve the understanding of the investigated topic.

Furthermore, at this time I had almost 20 years of experience in reporting facts and interviewing people as a journalist. I was very familiar with the fact that most people act and talk differently than what they think. Eventhough, specially during the first phase of the investigation, I found myself completely surprised with simple information given me by my second adviser, Prof. Vitor Hoefflich, who was very acquainted with the investigated context. At the end, although my extensive professional experience as an investigative reporter, the present research became a deconstruction process of the knowledge I already had about human communication.

Also important, I was aware of the limitations of my investigation, specially regarding the brief time (one month) of observation and acquaintanceship with the target group. But above all, I was aware of the challenge to scrutinize the habits of highly trained academics. The kind of people that are not accustomed to have their assumptions questioned, and that aren't normally aware of the extension of their own ignorance. Phenomenon commonly referred as “suprascientific knowledge” (Piaget, 1971 – p. 76), “academicism” (Abbott, 1988 – p.55), “ideological bias” of science (Postman, 1992 – p.16), lack of “critical perspective” (Forsythe, 1999 – p.137), or “lack of critical judgement” (Foster et al., 2007).

Epistemologicaly, the ethnographic approach considered any social phenomenon as dynamically dependent on its context. It is to say, that attitudes and behaviour from individuals are intrinsically connected to settings of the institutional and cultural environment. The so called “pervading unity of the phenomena of the world” (Bateson, 2000 – p. 75). Analogy, as much as general insight on science and academic work, combining strict and loose thinking (“dual nature of scientific thought”, p. 86), were important tools for the analysis, following the recommendations from Gregory Bateson in his book "Steps to an Ecology of Mind" (University of Chicago Press, 2000 – pg. 73 to 87).

One of the main analogies for the present dissertation is regarding the competitive willingness of the academic establishment nowadays. Phenomenon such “academic capitalism” (Young, Ioannidis, & Al-Ubaydli, 2008 / Fanelli, 2010 / Kyvik, 2010 / Kohlenberg & Musharbash, 2013 / Chomsky, 2014) can be taken as a pernicious anomaly to the collaborative effort in science. As in living systems, the real progress of scientific knowledge is highly dependent on collective and cooperative work among distinct organs. By harming such symbiosis, competition may also affects badly the substance of the academic endeavor (Hoekman, Frenken, & Tijssen, 2010 / Belbachir & Harik, 2013 / Silveira, 2014).

The premise to be verified in this investigation is quite simple. If this harming trend is showing evidence allover the world, it might be also truth for the context of Forestry Engineering at the Federal University of Paraná. The extent and relevance of its impacts in a specific environment, in case the Center of Forestry and Wood Technology at the Federal University of Paraná State (CIFLOMA/UFPR), may be among the concrete outputs of the inquiry.

The research strategy described above was inspired by the investigation done by Foster et al. (2007). Her study intended to understand habits and procedures of undergraduate students at the University of Rochester’s River Campus. Specially regarding their library's needs (reference outreach, online catalogs, institutional repositories, and Web-based services) when writing texts, or preparing the required academic work.

Based on a previous research about work practices of faculty members (Foster and Gibbons 2005), it started with a simple premise: there is an absolute lack of

information about how academic texts are produced. They refer to these set of actions as a "black box". Applying anthropological and ethnographic methods as well, the new research collected information on how students write their academic texts.

They were guided by a simple and yet actual question: What do students really do when they write their research papers? But before asking students directly, the authors had to see what the faculty members were expecting from the students, and thus to map their actions according to their objectives in attending faculty's expectations.

There were 14 face-to-face interviews with faculty members from humanities (6), social-sciences (5) and science & technology (3). Each interview had a strict time limit of 45 minutes.

In order to understand exactly how students write their texts, the authors applied several different and simple forms of observatory exploration ("...more than one hundred students who graciously allowed us into their dorms, took photographs, made maps, drew pictures, and participated in interviews..." (p.: vii)). This also includes a series of workshops, each one consisting of four activities:

- questionnaire on the participants' view about library services;
- warm-up exercise;
- brainstorming session;
- main exercise – the ideal online library design.

A second workshop was dedicated to review the library's existing homepage, and then proposed an ideal homepage. Interesting enough the students ended calling this ideal site as "everything machine", or "fantasy device" (Foster et al. 2007 - p. 31).

Among the most interesting questions for the present research, there is the inquiry about library's web presence, where the authors intent to answer how online libraries are used, and how could them be better used by students. However, this study was specially related to library activities, and not exclusively intending to see behavioral factors of authoring academic works.

Similarly to Nancy Foster (Foster et al., 2007) I decided to map academics' actions (writing, publishing) and choices (tools, procedures etc) according to their contextual expectations, institutional demands and personal interests.

2.2. Research strategy

Case study within the Graduate Program in Forest Engineering at the Federal University of Paraná[1], applying ethnographic research strategies, specifically collaborative ethnography. In case, participatory observation, exploratory discussion and face-to-face interviews combined with a survey.

Focus

The focus lies on the application of on-line tools for collective writing of scientific papers and articles. Therefore, the main incentives and barriers to the production of co-authored texts within existing platforms. The interviews explored a broad range of possible collaborations, from a co-located team of a single field of study, up to the cooperation among several fellows of a distributed and interdisciplinary team.

Goals

This inquiry aims to understand the behavior and attitudes of a specific group of Forestry scientists from Brazil in what it concerns writing and publishing behavior. The investigation first explores the perceptions of the interviewees in what they concern certain terms and issues (e.g. "digital media", "collaborative work", "academic publishing culture", "personal motivations" and "institutional support towards collaborative work"). New questions and issues arise according to the answers given during the development of the interview. This approach was guided by the general goals of the research, among them:

- Better understanding of academic writing practices;
- Exploration of institutional structures and processes of scientific publishing;
- Indication of possible policies to support collaboration.

Another goal of these interviews is to further explore some problems of scientific collaboration that have arisen from the investigation.

[1] http://www.floresta.ufpr.br/pos-graduacao/

Target Group

53 professors and researchers of the Program (position in August 2012), that are enabled to advise research works of 89 students at master level and 130 students at doctoral level. They are based in three departments (Departamento de Ciências Florestais, Departamento de Engenharia e Tecnologia Florestal, Departamento de Economia Rural e Extensão) working within the respective fields of study[1]:

- Nature Conservation
- Forest Economy and Policy
- Forest Management
- Silviculture
- Technology and Application of Forest Products

Institutional environment

The CIFLOMA, a center where the Graduate Program happens, lies inside the main Campus of the UFPR. It consisted of a single main building, surrounded by other smaller buildings where few Laboratories are installed.

Although this seemingly unified physical structure, each of the three Departments in which professors were working has its own history, structure, hierarchy and goals separately. Indeed, competition for funding and prestige among these structures is a characteristic promoted by the institutional policy. Even if some laboratories could be shared by different departments, they were used separately in order to produce different projects and achievements. Very rare one laboratory was used by the three Departments together, and the results of such initiatives were daunting.

The same separation was verified among the five fields of study, where was also clearly present a competitive spirit even among members of a single field. Once more the institutional policy was pointed as responsible for such situation. A practical example regards the policy for tenure and election of new members of each staff. Some professors complained about clustering trends inside fields and departments, where leading members had act in order to favor candidates they would like to promote or to elect, ignoring principles of competency and contribution to scientific work.

[1] http://www.floresta.ufpr.br/pos-graduacao/index.html

A couple of cases of professors that were isolated from others were reported, and the female members of the staff complained about the predominance of male among professors, specially in leading positions.

Non ICT expert audience

Other important characteristic of the present inquiry is that I didn't seek a group with expertise on Internet or in social communication. The idea is exactly to examine how experts of forestry as academic discipline, but without direct relation to communication or information science would be using contemporary tools and technologies for communication, and mainly search for answers on why they are proceeding so.

Sampling technique

The sample technique applied to select the interviewees was "snow ball". It started with three institutionally significant contacts made during the preparation period. And each one of them was responsible for recommending further contacts and tactics to approach candidates to be inquired.

Initial Contacts

- Prof. Graciella Muniz - Coordinator of Scientific Research and Technological Development of the Federal University of Parana. Rua Dr. Faivre, 405 - Ed.D.Pedro II, 1ºAndar, Centro - 80060-140 - Curitiba, Paraná, Brasil. Telefone: (41) 3360-5331 / 3360-5332. FAX: (41) 3360-5113. E-mail: prppg@ufpr.br
- Prof. Antonio Carlos Batista - Graduate Program Coordinator Contacts: +55 41 3360-4230 / batistaufpr@ufpr.br
- Prof. Vitor Afonso Hoeflich, D. Sc. within Rural Economy - Professor of the Graduate Program in Forest Engineering in the areas of Forest Policy and Economics - Agricultural Policy - Supply Chains - Benefits of Forests 2000-2010 - General Board Member at IUFRO-International Union of Forest Research Organizations (www.iufro.org). Contact: 41-3360.4320, 41-3360.4206 (recados) - 41-9602-9350 fax 41-3360-4211. skype: vitor.hoeflich

Relevance and significance of the target group

For the present investigation the aspects considered for selecting the group are basically related to study field definition and significance of the population regarding the project goals and the methodology applied, and also in respect to historical and institutional relevance of the group.

Conceptual definition of the study field

Initially it is important to see the academic field in which the inquiry is developed. This helps to define the knowledge and information range of the interviewees.

The term forestry (silviculture) comes from the Latin word "silva" (forest) and "cultura" (cultivation). According to Louman et al., 2001 (in Ribeiro et al., 2002), forestry is the art, or the science of manipulating a system dominated by trees and their products, based on knowledge of the ecological characteristics of the site, aiming to achieve a desired state, economically profitable. In other words, "forestry" is an applied science, compromised mainly to productive and economic outcomes.

Forest engineering has a broader definition and scope. It is also a branch of agricultural sciences. According to the Portuguese Wikipedia (position on 23/02/2011), forestry engineering is a branch of engineering dedicated to the production of goods and services originated from forests and forestry crops. However, to the present work we consider the definition stated at the program's website. It says: forest engineering is an academic field that covers the various forms of knowledge related to cultivation, maintenance and utilization of forests.[1]

Significance of the group according to the research goals and methodology

There are dozen academic institutions offering Graduate courses within forest studies in Brazil nowadays. These institutions are basically from three kinds: private, public and mixed.

Generally, on the private sector the focus lies on development and application of products and services, while on the public sector, especially universities, are dedicated to teaching, basic and applied research. The mixed institutions are flexible, usually intermediating relations among different actors of the field, or working according to the demand of public and private sectors.

[1] http://www.floresta.ufpr.br/pos-graduacao/

Regarding the present work, a core difference among these types of institutions is that only public institutions are required by law to produce information as a public good. Thesis and dissertations defenses are usually made in public sessions according to the by-law of the Program[1]. Besides that, "it is forbidden for a member of the program to produce articles or knowledge using the university's infra-structure in demand of private or individual interests", adds Professor Vitor A. Hoeflich, second reader of the present dissertation and staff member of the Graduate Program.

Another criterion for this investigation is the requirement of a minimum number of publications for every staff member of the program. According to a rule of the Coordenacão de Aperfeicoamento de Pessoal de Nível Superior (CAPES[2]), body of the Ministry of Education, only professors with a minimum score of at least three articles published per year are able to advise thesis and dissertations in graduate programs. Besides that, the UFPR's Graduate Program in Forest Engineering demands students to submit at least two (for master students) and three (for doctoral students) scientific articles to specialized journals during the course. This is what we may call a potential framework for co-located co-authorship.

Thus, we are investigating a group of scientists with a minimum record of publications (three scientific articles per year), and which are required by law, according to their academic context (Public university), to produce this information as a public good.

Relevance of the target group in its historical context

Since this research has been conducted from a university campus in Germany, it is interesting to mention that the first institution dedicated to the study of forest sciences in the world was created in 1811 in Tharandt, Germany. Indeed, for more than 20 years after that, Germany was still the only country to offer formal academic education in forestry, including universities and schools in Gissem, Eberswald, Eisenach, Carlsruhe, Munich and Tübigen.[3]

On the other hand, the first forestry school in Brazil was created only in 1960, at the city of Viçosa, Minas Gerais State. It was the National School of Forests. Four years later, this School was transferred to Curitiba, in the Southern State of Paraná. Thus,

[1] http://www.floresta.ufpr.br/pos-graduacao/programa/regimento_mestradodoutorado.pdf
[2] http://capes.gov.br/
[3] Source: Brazilian Society of Forest Engineers - http://www.sbef.org.br

the Federal University of Paraná was the second to offer an academic degree in forest sciences in Brazil.

Almost a decade later, after an agreement between the UFPR and the Albert-Ludwig University, from Freiburg, Germany, it was possible to arrange the first graduate course (master degree) in Forest Engineering at a Brazilian university. The master course was created in 1973, and nine years later, this same Department of Forest Engineering starts the first graduate course at doctoral level in Brazil.[1]

The main responsible for the implementation of the Forestry Graduate School at the UFPR was professor Gerhard Speidel, coordinator of the program at UNDP/FAO aiming to consolidate the implementation of under-graduate and afterwards graduate programs of forestry in South America, including Brazil. The main reason for the creation of the Graduate Program on Forestry at the UFPR was that at the time Curitiba was the largest furniture industrial center in South America.

Today Brazil is involved in many cooperation projects in the field. "From helped, we became helpers", declared one of the interviewees of the present investigation.

Relevance of the target group in its institutional context

It is important to mention that the Universidade Federal do Parana (UFPR) is one of the first universities in Brasil, which completed 100 years of existence in 2012. UFPR is also a pioneer institution of academic teaching and researching of forest sciences in Brazil. Besides that, the Graduate Program in Forest Engineering at UFPR is nowadays ranked among the five best courses of the country on the topic. The ranking made by the Coordenacao de Aperfeicoamento de Pessoal de Nível Superior (Capes[2]), a governmental body of the Ministry of Education, is quarterly updated. The main criteria for this evaluation are:

- Number of publications in general (articles, papers and books);
- Number of articles in international publications;
- Number of thesis and dissertations defended (titles granted);
- Number of patents registered;
- Number of foreign students.

The coordinator of research and technology development at the UFPR, Prof. Graciela Muniz, added that nowadays they are working on establishing other criteria

[1] Source: http://pt.wikipedia.org/wiki/Engenharia_florestal
[2] http://trienal.capes.gov.br/?page_id=100

about the "integration of the research work into society". "It is a continuous process of advancing and improving the quality of our research, and therefore its evaluation", she said.

2.3. Questionnaire's structure

The inquiry was composed by two main parts. One dedicated to investigate the technological literacy and general view of the target group about its own scientific collaboration activities. The other focused on exploring the way interviewees are used to write and publish their texts, besides a scrutiny of the main barriers and problems regarding scientific collaboration. To investigate these topics I choose to apply two distinct tools: a quantitative (survey[2]) and a qualitative (in-depth interview). The core characteristics of each investigation's tool are:

Quantitative (survey)

Scope: How academics usually collaborate when writing and publishing scientific texts?

Features: The quantitative inquiry is composed by 12 questions, made up basically of grid, simple and multiple choices, including comments (paragraph texts) after each question. It was developed as a Google Docs (currently Google Drive) The features of Google Docs allow the direct view and interaction within the structure of the survey.

Qualitative (in-depth interview)

Scope: Perceptions of academic publishing culture, co-authorship and collaboration in general...

Features: The qualitative part is composed by 06 exploratory questions, which are concerned with the main topics of each part of the questionnaire. They are applied in parallel with the survey, and accordingly to the situation of the interview, allowing the interviewees to speak as freely and openly as possible.

[2] https://spreadsheets.google.com/viewform?formkey=dEwwY1BnUElDWHFvUHR1NWpsZTNyY1E6MA

Questionnaire's application

The questionnaire was administered merging quantitative with qualitative questions, in a sequence intended to produce more balanced and cohesive answers, divided according to topic as follows:

Part 1 - Technological literacy and general view on collaboration

Here I asked about habits and usage of communication technology for academic purposes, and about the perception of main characteristics of their collaborative work. It intended to reveal the technological literacy of the group, and how it is related to the collaborative characteristics of their research work. The sequence of questions and each respective type, goal and options was proposed as follow:

SURVEY

Question: **1) How often do you use each online technology / tool below listed?**

Type: Simple Choice = Frequency

Goal: The question intended to reveal the most used tools and the less used tools. Furthermore, it wanted to show how often/frequent each tool has been applied, without differentiating "active" from "passive" user.

Options: The 12 tools and applications inquired were chosen according to previous surveys and studies regarding the potential for the improvement of communication among academics (Nentwich, 2003 / Senna da Costa, 2006 / Bell, Foster, Gibbons, & Lindahl, 2007 / Bollier, 2011). They were:

a) - Voice / Instant messaging (e.g. Skype, MSN, Google Talk)
b) - Online Bookmarking (e.g. Connotea, Del.i.ci.us)
c) - Online tool for creating and sharing content (e.g. Google Docs)
d) - Social networking (e.g. Facebook, MySpace, Ecademy)
e) - E-learning platform (e.g. Moodle, Blackboard)
f) - Weblog (e.g. Blog da Floresta, Foresttalk)
g) - Microblog (e.g. Twitter)
h) - Online Public Access Catalog of Libraries (e.g. OAIster.org)
i) - Open Access Repository (e.g. Revista Brasileira de Ciências Agrárias)
j) - Institutional Repository (e.g. Banco de Teses e Dissertacões-UFPR)
k) - Feed Reader (e.g. NetNewsWire, RSSOwl)
l) - Wiki-page (e.g. Wikipedia, Wikiversity)

Question: **2) How do you usually EXCHANGE / SHARE academic material, information and discoveries?**

Type: Multiple choice = 03 most important tools.

Goal: The question intended to point out to which proportion traditional / online media is been used to share academic content. It also intended to reveal how much of the target group refer to “Google Docs” (Online shared content creation), and to “Intranet” among the most used. These two kinds of applications were considered central to the present investigation due to their disruptive potential of traditional forms of academic communication (Bell, Foster, Gibbons, & Lindahl, 2007 / Bollier, 2011) . In special, regarding writing and publishing activities.

Options: The eight (08) options were based on my previous investigation (Senna da Costa, 2006) and on the tests (section 4.1 Preparative inquiries) conducted during the preparation of the research project. They were:

a) E-mail
b) Instant messaging (e.g. Skype, MSN, Google Talk)
c) Social networking platform (e.g. Facebook, Twitter, Ecademy, Orkut)
d) Online tool for creating and sharing content (e.g. Google Docs, Office 365)
e) Intranet (e.g. Moodle, Blackboard)
f) Conferences, workshops, events
g) Lectures, informal meetings
h) Other

Question: **3) Which services / systems do you usually apply for PUBLISHING or to DISSEMINATE your work?**

Type: Multiple choice = Máx. four (04) options.

Goal: The question intended to reveal the most and the less applied ways of work dissemination. Specially, to which proportion traditional and online media are been used. Also important was to verify how much of the chosen population is referring to "Google Docs" among the most used.

Options: The 13 options were chosen during the preparation period of this project (section 5.2 Preparative inquiries). In that regard, informal talks and interview tests with professors and researchers were the most helpful in defining the options to be part of the questionnaire. They were:

a) Personal meetings and talks
b) Lectures
c) Exhibitions and presentations
d) Online Forums and E-mail lists
e) Personal webpage
f) Institutional webpage
g) Wiki-pages
h) Weblogs or Microblogs
i) Online journals and magazines
j) Print-based publications
l) Online public access library
m) Online tool for creating and sharing content (e.g. Google Docs, Office 365)
n) Other

Question: **4) Could you please indicate the tools you usually apply for REFERENCES gathering / BIBLIOGRAPHY management?**

Type: Multiple choice = all options applied

Goal: The question intended to show the most used, and the never used systems for bibliographic management. The focus was specifically in showing what is the proportion between "userbased" and "webbased" tools.

Options: The seven (07) options were those mentioned by interviewees of the survey tests (section 5.2 Preparative inquiries) during the preparation phase of this project. They were:

a) LaTex
b) Text editor (e.g. OpenOffice, Microsoft Word)
c) EndNote
d) Zotero
e) Citavi
f) Del.ici.us / Connotea
g) Other

IN-DEPTH INTERVIEW

Question: **I) What are the main motivations / reasons behind the choice of certain communication tools / procedures at academic environments, specially concerning writing and publishing academic texts?**

Goal: This question intended to explore individual interests and motivations, but also main key factors related to the answers given to the previous questions of the survey. In few words, its goal was to help in understanding how current

communication habits were built. It inquired about examples of tools from the survey as well, giving full freedom to the interviewees to assert their opinions about the tools they used, and about the tools they never tried. Of special interest there was the verification of how many of them already had a weblog. This was a fundamental point to this investigation, since weblogs are considered a fully new form of literature (Gatti, 2012), with greater new possibilities of collaboration and participation (Lyon, 2009).

SURVEY

Question: **5) What are the main characteristics of the research collaboration you are currently involved in?**

Type: Percentage Grid / Estimation according to time dedicated and output

Goal: The question intended to reveal any clear pattern, or usual form and structure of the collaborative work performed according to three important parameters (co-located, interdisciplinary, multi-institutional), as defined in recent literature about scientific collaboration (Newman, 2001 / Camarinha-Matos & Afsarmanesh, 2004 / Shrum, Genuth, & Chompalov, 2007 / Olson, Bos, & Zimmerman, 2008 / Rubí-Barceló, 2008 / Yao, 2009 / Hoekman, Frenken, & Tijssen, 2010). It also intended to verify to which extent there are ideal conditions for online collaboration, considering these basic parameters. And, according to the researchers perception, how relevant conventional forms of communication are at the moment.

Options:

a) Distributed (100% - 0%)
b) Interdisciplinary (100% - 0%)
c) Multi-institutional (100% - 0%)

Part 2 - Collaborative writing and publishing

Description: Here I asked about the experience and perception of scholars when writing and publishing academics texts in collaboration with other fellows. A special focus was to verify the willingness of the target group in sharing efforts, resources and rewards for their work, in comparison to the traditional individual evaluation and assessment system applied to most academic institutions in the world. The

sequence of questions and each respective type, goal and options was proposed as follow:

SURVEY

Question: **6) Do you publish your "work in progress" in its early stages or it remains currently unpublished?**

Type: Simple choice

Goal: The question intended to reveal the predisposition of academics of the selected program in opening their work in progress. It was considered “work in progress” mainly the contributions done in online tools and vehicles like lab notebook, or weblog's activities.

Options: The five (05) options offered a scale of “openness” as defined by Grand, Wilkinson, Bultitude, & Winfield (2010), what includes a certain “subversive” view of the traditional structures of scientific content outreach. They were:

a) Yes, publicly
b) Yes, within my research community / field
c) Yes, within a small network of collaborators
d) No, but I intend to do in the future
e) No

Question: **7) To what extent do you agree that other researchers are likely to copy or steal your ideas and work if you publish them online?**

Type: Simple choice

Goal: The question intended to see if researchers feel threatened by the "openness" and "transparency" characteristic of the "online" communication (Nentwich, 2003). The choices wanted to better reflect the audience's perception about topics like “information secrecy” and “intellectual property”.

Options: The six (06) options covered a scale of general consent, intending to unveil the degree of importance attributed to the issues mentioned above. The options were:

a) I strongly agree
b) I moderately agree
c) I strongly disagree
d) I moderately disagree
e) I have no opinion about

f) Other

IN-DEPTH INTERVIEW

Question: **II) How publishing scientific texts / papers contributes to your academic career? Is there any different impact within co-authored publications? Explain, give examples... How are co-authored and single authored texts valued / counted?**

Goal: The question intended to explore main reasons for the production of scientific texts. Specially in regard to possible advantages for co-authorship. It focused on differences between institutional justification for certain rules or norms, and real motivations of academics for publishing.

Question: **III) Are there certain journals in your field that count more for promotion and tenure? Therefore, what is your perception of the "open access" publishing phenomena? It offers extra incentives for collaboration via Internet? How? Have you published works under open access licensing? Why?**

Goal: The question intended to verify the extent of the influence of the current academic establishment on scholars' perception about publishing activities. The main intention was to evaluate possibilities for the development of a new Internet and publishing culture among academics of the inquired audience.

SURVEY

Question: **8) How many academic articles do you usually write per year?**

Type: Simple choice / Texts published in the last 12 months

Goal: The question intended to reveal how active is the target audience regarding the production of scientific texts.

Options: The five (05) options were chosen from the results given in the survey tests (section 5.2 Preparative inquiries) during the preparation process of the investigation project. They were:

a) None
b) 1 to 5
c) 6 to 10
d) 11 to 20
e) more than 20

Question: 9) From these, how many articles did you write in collaboration with other fellows?

Type: Simple choice / The most approximate option.

Goal: The question intended to reveal the frequency of publication among scientists of the target audience. The idea is to apply the number average as a proxy to determine how collaborative, regarding co-authorship, are the researchers when producing academic texts.

Options: The six (06) options were created in order to propose a scale of co-authorship, highlighting the verified tendency according co-authored or single-authored texts. They were:

a) None
b) Almost none
c) Less than half
d) More than half
e) Almost all
f) All

IN-DEPTH INTERVIEW

Question: **IV) Therefore, what are the current motivations for you to write articles together (in collaboration) with other fellows?**

Goal: The question proposed to explore individual interests and motivations for publishing articles, with special interest within activities involved in co-authoring scientific papers. Following the results of previous investigations (Senna da Costa, 2006), some expected answers were:

- Decrease conflicts of interest
- To get it easier
- Expert knowledge interaction
- Improve career records
- Improve institutional ranking
- Improve the visibility of own work
- Access to funding opportunities

SURVEY

Question: **10) How big is your academic network of collaborators / co-authors?**

Type: Simple choice / Estimated number of co-authors for the last year

Goal: The question intended to check the size of co-authors network among the interviewees, trying to see any clear pattern in the target group

Options: The six (06) options were proposed to cover all practical possibilities of networks of co-authors verified nowadays among academics. They were:

a) 1 up to 3 fellows
b) 4 up to 10 fellows
c) 11 up to 20 fellows
d) More than 20 fellows
e) I don't know
f) Other

Question: **11) What tools / procedures do you usually apply to perform collective writing / co-authoring?**

Type: Multiple choice = up to 03 (three) most applied options

Goal: The question intended to reveal the most important / used forms / tools for co-authoring texts. A special interest was to see the acquaintance of the academics from the target audience regarding the "Online tool for creating and sharing content/ Google Docs". It is taken here as a proxy of collaborative / co-creative (Bonney, et al., 2009, in Grand et al., 2010) potential. Also as a goal, there was an intention of drawing a comparative analysis between conventional communication and online systems, in terms of their importance and relevance for co-authoring.

Options: The nine (09) options were taken from my previous research (Senna da Costa, 2006), and from the survey tests conducted during the preparation phase of the present work. I also took in consideration other spontaneous possibilities (e.g. Wikiversity) in order to see if the audience would ever consider them as an option for the future. They were:

a) Word documents via E-mail
b) Public discussion forums (e.g. Yahoo lists)
c) Intranet platforms (e.g. Moodle / Blackboard)
d) Online tool for creating and sharing content (e.g. Google Docs)
e) Wiki-page (e.g. Wikiversity)
f) Weblog (e.g. Foresttalk)
g) Institutional repository (e.g. Banco de teses e dissertacões-UFPR)
h) Online publication (e.g. Revista Floresta, Open Journal Systems)
i) Other

IN-DEPTH QUESTION

Question: **V) Do you have any offer from your department of courses, upgrades, actualization etc, of new tools for academic networking, research collaboration or co-authoring? Please specify when, what, how, and comment the results and benefits.... Are there institutional incentives to try out alternative tools / methods?**

Goal: The questions aimed to check institutional policy in what it concerns scholar communication and scientific publishing.

SURVEY

Question: **12) Could you please indicate the relevance of the barriers listed below regarding collaboration / co-authorship on your scientific field...**

Type: Grid of relevance for each factor

Goal: The question intended to reveal the most relevant problems for collaboration and co-authorship, specially in regard to see if there is any clear pattern regarding problems for writing papers with colleagues.

Options / Factor: There were seven (07) factors taken mostly from my previous investigation (Senna da Costa, 2006). Each factor was inquired with a grid of relevance divided in five (05) possible options, from “Very relevant” up to “Irrelevant”, and one option for lack of awareness (“I don't know”). The examined factors were:

a) Unorganized information flow
b) Data deluge / excess of information
c) Online tools lack trustful processes
d) Bureaucratic requirements for researcher
e) Missing incentives towards collaborative research
f) Trust and dialog are harder to be produced at virtual environments
g) Spirit of concurrence at academic environment.

IN-DEPTH QUESTION

Question: **VI) Please, explain how the main barriers / impediments for the full development of scientific collaboration operate in your department... What is missing for the full development of a collaborative work on research?... What**

is missing to promote the improvement of scientific collaboration?... Please explain a bit each of your choices...

Goal: The goal was to find the main problems according to researchers' perception, and see how the current institutional policy is addressing them. There were some expected answers taken from my previous investigation (Senna da Costa, 2006). They serve here as a guidance parameter, in order to support further discussion about possible solutions for the given problems. They were:

a) Institutional policy
b) Cultural change
c) Lack of incentives (funding, policy) is the most relevant problem for collaboration... there is no specific norms or rules (ranking) towards cooperative work...
d) Information organization
e) Information services / structure at my institute
f) Knowledge access and transference
g) Content qualification and eligibility
h) Financial support
i) Technological literacy
j) Better software / tools
l) Lack of awareness for communication issues
m) Problems of administrative / institutional structure
n) Lack of trust

3. Literature Review - scientific collaboration on the Internet

> **“Materialism is the auxiliary doctrine of every tyranny, whether of the one or of the masses”,** (Harold A. Innis, in The Bias of Communication – University of Toronto Press, 1951 – p. 82)

Collaboration in scientific research has traditionally been associated with shared location. In other words, a team of researchers who are in the same physical location, can better align their goals, build trust and share resources, which subsequently reduces communication and coordination costs (Olson, Bos, & Zimmerman, 2008). However, a contemporary idea of collaboration understands that co-location is no longer a fundamental factor for team work to occur. Manuel Castells (1996) was one of the first to call for an end to "the tyranny of distance". More recently, the “cyberscientist” Michael Nentwich (Cyberscience. Research in the Age of the Internet, 2003) has predicted a future in which physical distance and physical structures become less important to academics.

Information and Communication Technologies (ICTs) allow not only simultaneous and distant collaborations, but also the production, management, storage and distribution of any amount and format of data on specialized, sophisticated, and expensive infra-structure. Tim Berners-Lee, one of the creators of the World Wide Web (WWW) says that the next paradigm on the Web is a process in which the data created on the Internet starts to be interlinked, and brought together in order to produce a more broad, deep and clear vision about the state of the world.

Lee hopes that all institutions are going to follow this trend and to put their data online. He summarized the issue as follows:

> "It is important not only for transparency.... but a lot of the state of knowledge of the human race is still being stored in data-bases that are not shared for the public benefit... we must unlock these data".(TED 2009)

The report “Scientific Collaboration on the Internet” (Olson, Bos, & Zimmerman, 2008) initially defines collaboration in science as an "area of distributed, collaborative science" (p. 07). Later the concept evolves to a "theory of remote scientific collaboration" (p. 09). Pursuing a “truly cross-disciplinary understanding” of the scientific collaboration's phenomena (p. 377), the authors conclude that successful collaborative work among scholars involves not only shared data, tools

and infrastructure - it highly depends on the alignment of goals, interests and institutional settings. A question from Liz Lyon (JISC, 2009) seems highly relevant :

> "How are the methodologies and tools for data quality, validation and verification, which underpin robust and trustworthy large-scale models and simulations, implemented in different disciplines? Are appropriate data quality standards in place?" (p.07)

In general, it is already accepted that the Internet amplifies the possibilities of communication, data analysis and combinations of the two; not only is the way collaboration done changing, but the idea of collaboration has already changed. Among concrete promise from recent virtual research communication technology developement, there has been the achievement of cross disciplinary collaboration (Sonnenwald et al. 2009).

Practical examples

It is easy to find examples of international collaboration projects in physics and other related fields. The Cryogenic Dark Matter Search (CDMS)[1], a project from Berkley University funded by the National Science Foundation and the United States Energy Department (USED), is a good example on how scientists use communication technology to collaborate across distances and with interdisciplinary teams.

A similarly important example is the Long Baseline Neutrino Experiment Project (LBNE)[2], a collaborative entrepreneurship initiative carried out by the Fermi National Accelerator Laboratory (Fermilab[3]), also under the USED and forty other institutions. With collaborators from Japan, Italy and India, on its website, the LBNE encourages "further international participation" in order to investigate important topics in physics and astrophysics, such as the analysis of "neutrinos emitted by supernovae in our galaxy and beyond".

Collaborative experiments including the Arts and Humanities are also easily accessible on the Internet. Some such projects try to incorporate artists into scientific projects in complex areas, such medical studies (Psychiatry)[4]. However, the methodological approach in collaborative projects that include the Arts and

[1]http://cdms.berkeley.edu/

[2]http://lbne.fnal.gov/collaboration/general_info.shtml

[3]http://www.fnal.gov/

[4]http://experimentincollaboration.blogspot.com/

Humanities differs deeply from those projects in other disciplines, making any kind of translation, comparison or extension of methods, data and results very difficult.

Historically, in the so-called “hard sciences”, like Physics, researchers have collaborated more than in Social Sciences and in the Humanities. One of the reasons for this difference relates to the very nature of each discipline. Fields such as Astrophysics are heavily based on data, which is easier to extend and to share than complex ideas involved in the human and social areas of the academy, such as Anthropology. Research data in this discipline may be more difficult to communicate through media. Another hypothesis for the contrasting use of collaborative platforms are the factors of utility and accountability, which may be harder to prove in order to gain funding and support for collaboration in the Humanities. The “word disciplines”, such as History and Philosophy, are not usually concerned with practical solutions to the current political or economic issues, and therefore, there is less incentive to produce joint projects in these fields (Baldwin & Austin, 1995).

It is also important to note that there are no systematic and publicly available evaluation processes for the collaboration involved in the examples above, or even about the methods and tools applied within collaborative projects. This may be due to the ideological influence of corporatism verified in any academic institution all over the world (Segersträle, 2000 / Critical Art Ensemble, 2001 / Maniates, 2003 / Silveira, 2014 / Aschwanden, 2017), which does not value transparency and knowledge sharing, or simply misuses this very ideals of scientific endeavor.

The influence of corporations in academia (and in collaborative projects) is a phenomenon that is also related to the concept of “monopolies of knowledge” (Innis, 1951 – p. 80 / Soules, 1996). The core idea of an exclusive right over the production of expert and scientific information attributed to academic institutions. In this case who monopolizes knowledge is the same one who legitimates it, defining the external form of social control as well. Such a theory is corroborated by the fact that education was a privilege of the rich class until the nineteenth century, what explains, at least partially, the authoritative model of our current graduate programs (Adorno & Horkheimer, 1944).

3.1 Missing questions

The most concrete Social Sciences' literature about "scientific collaboration" concentrates on quantitative evaluation of networking patterns (Hoekman et al. 2010 / Gomes, Prudêncio & Nascimento. 2017). The new discipline “Scientometrics”, which has arisen from Bibliometrics, has become a dominant in the field of Library and Information Sciences (Markscheffel, 2013).

A simple search in the Library & Information Science Abstracts (LISA[1]) using the word “co-authorship” rendered 472 peer-reviewed results (December 2014), dominated by pieces from Bibliometric studies. In fact, of the first twenty items reviewed in this search (April 2014 to Jan 2013), only two were not related to bibliometric matters. In comparison, sixteen others use co-authors, citations and research-impact data in order to assess academic performance, work quality and collaboration structures. From the point of view of an experienced writer and editor, it was clear that bibliometric approaches are misusing and distorting basic concepts.

Independently from the quantity of articles, co-authors or citations, the matter here is that the context in which collaboration is happening does not favor the improvement of the relationships among scientists. And this is exactly an aspect that is being ignored by most of the content produced in Information Science nowadays. It is for sure a critical, even negative approach, which was already highlighted by the Research Question (“...discourage...”).

Virtual collaboration is being promoted as a panacea for the advancement of science. And this is happening without considering whether social actions involved in collaborative acts are improved by the application of new communication technology. As most recent research indicates (Aschwanden, 2017), the issue might be of a moral order, rather than regarding scientific matter itself.

Among the concrete problems, there are very few journals, even in Natural Sciences, Biomedicine and Technology, which pay attention to fundamental criteria for authorship attribution in research. There are no formal guidelines regarding the order in which authors' names should be presented, or how to differentiate between acknowledgement, contribution and authorship. In the end, it is possible to predict and to see a continuous series of bad practices related to academic recognition,

[1] http://search.proquest.com/lisa?

personal merit and ethics, and this raises serious questions about the current assessment procedures in place at graduate programs around the world (Levitt & Thelwall, 2013 / Ruiz-Perez, Marcos.Cartagena, & Delgado Lopez-Cozar, 2014).

Few studies argue for the necessity of expanding the coverage of bibliometric data beyond the big databases, such as Web of Science[1] (Thomson Reuters) or Science Direct[2] (Elsevier), or to include multiple types of publication, like books and monographs, in the analysis of scholarly indexes. Eventhough, such kind of expansion would allow, for instance, more consistent evaluation of the relationships between co-authorship and the mechanisms and incentives for publishing (Ossenblok, Verleysen, & Engels, 2014), this is still a preliminary issue.

It seems there is, in the first place, grave urgency for a better understanding of the very nature of scientific collaboration, before there can be a better understanding of quantitative methods involved in academic assessment.

Quantitative techniques can convey simple and powerful ideas, such as graphic representation of the structures and features of social networks. For instance, some well-known assumptions like the “small world” characteristics of certain communities of academics may find concrete evidence through some experiments (Newman, 2001). Below there is the graphic representation of the "small-world phenomenon" designed by Watts and Strogatz 1998 (in Yao et al. 2009):

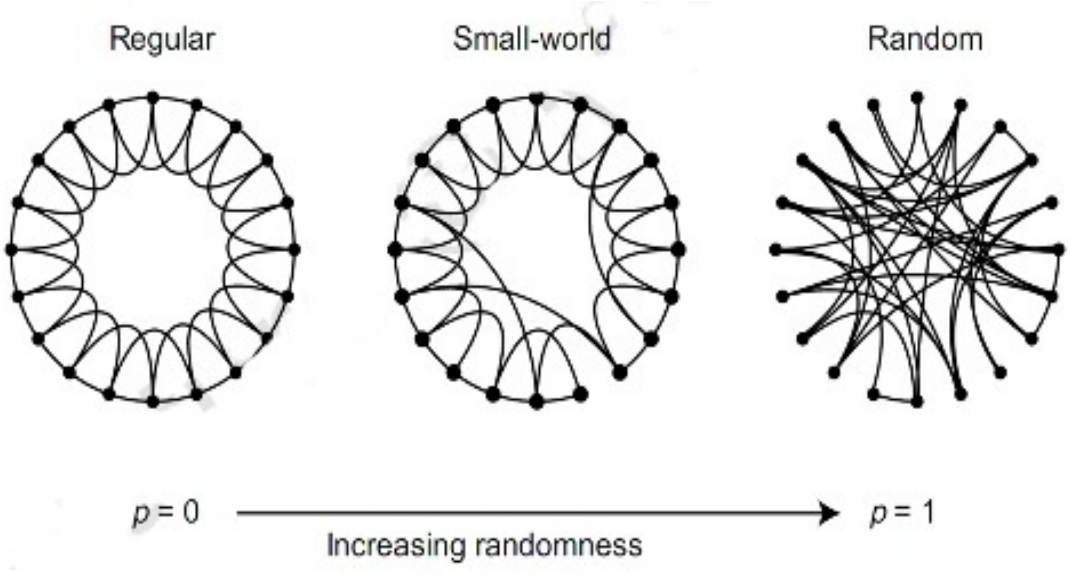

Figure 2 - Graphic representation of scientific network qualities (Watts and Strogatz, 1998).

[1] http://wokinfo.com/
[2] http://www.sciencedirect.com/

Without taking into account institutional context and individual interests, Mark Newman[1] is among the most known physicists who promote a quantitative perspective on complex systems and human behavior. His most representative work (The structure of scientific collaboration networks — PNAS, 2001) described the clustering pattern of some scientific communities. This work is based on the statistical premise that two scientists typically have a 30% or greater probability of collaborating, if both have collaborated with a third scientist in the past. In the end, Newman concludes that the majority of academic communication is still based on private conversations.

There are other forms of analogy regarding collaborative patterns of scientists. Link prediction on social networks is among the newest (Asil and Gürgen, 2017). Research collaboration has also been modeled based on Newton's law of universal gravitation:

> "The gravitational force between two entities is dependent on their masses and the distance between them" (Hoekman et al. 2010, p. 665).

The main point for the present investigation is that such premises and methods still dominate scientific initiatives that are trying to understand the social settings and work contexts of academics, although by now, their limitations are well-known in most science fields. Many forms of scientific collaboration do not produce co-authored texts or formal acknowledgments in scientific content. And not rare co-authorship represents false positive relations arising from institutional demands (Cugmas, Ferligoj, and Kronegger. 2017). Examples are abundant.

By examining co-publication activities in the European Union over time (2000 - 2007), Hoekman's group (2010) focuses their investigation on the effects of geographical distance (regional and national boundaries) on co-publication activities. However, the results demonstrate the impossibility of developing a clear understanding of the effects of Europe's policy efforts regarding collaboration through the analysis of bibliometric data.

This kind of analogical extrapolation, relating quality to quantitative data, seems to have become a global standard. For example, in the case of Information Science in Brazil, scientific networks are still being described according to the data related to

[1] http://www-personal.umich.edu/~mejn/

co-authorship activities on official platforms, such as “Lattes”[2]. This is the main database used for the assessment of scientists in graduate and undergraduate programs, and its indexes follow the international standards of Bibliometrics.

Using the most modern algorithms for the extraction of topological metrics among researchers, such studies miss the point, when they try to define and to understand human behavior through quantitative analyses of names published in papers from very different areas such as, Agricultural Sciences and Linguistics (Mena-Chalco, Digiampietri, Lopes, Cesar & Marcondes, 2014).

The false premise in the study conducted by Mena-Chalco et al. (2014) is related to the impossibility of understanding human behavior solely from quantitative outputs, and specifically when the main norms, constraints and motivations verified in the context are absent or completely ignored in the analysis. The same applies to the structure and dynamics of co-authorship networks. It is impossible to imagine a reliable description of any relationship without considering intrinsic values and aspects, such as the relevance of a contribution, or institutional policies that affect the outcome.

As an example, in the study, the interpretation of “oscillatory behavior” (2014, p. 1441) might, in fact, be wrong. It can represent, dependence or independence from any other factor influencing audience's behavior. However, the paper does not mention the nature, type or characteristics analyzed. Even though, it intends to provide a macro level analysis of the relations among very different academic communities. Among other weaknesses of this study, there is the fact that it only considers one type of academic publication (journals). As already mentioned, the ever increasing number of articles presents a barrier for scientific advancement with a considerable “cognitive challenge” to academics in all fields (Davis, 2014 – p. 193).

These shortcomings relate to core flaws in bibliometric analysis, which make arbitrary analogies between quantitative outputs and qualitative properties, or ignore other kinds of interactions and factors in research environments. This issue has been addressed for decades without proper consideration by authorities and campus administrators. Among the main weaknesses of quantitative methods to

[2] http://lattes.cnpq.br/

assess communication (e.g. citation and co-authorship analyses), there are the implicit assumptions about the nature of science. Among the most significant biases for the present research, there is the compulsory dismissal of contextual information that may influence behavior (Edge, 1979).

3.2 Origins of a problem

Problems of scientific communication and publishing have been well known for decades. Countless published studies confirm a pattern of dissatisfaction of scientists regarding the way their work is assessed and distributed. When asked about why the current practices in publishing endure, scientists usually blame a lack of time or a lack of support or reward to make changes. There are cultural aspects that also play a decisive role in the maintenance of current practices in academic environments, and the mechanisms involved are urgently needing further investigation (Tenopir et al., 2011 / Minet, 2017).

The problem lies in the very nature of human communication, and therefore, in scientific endeavor. In other words, it is a fairly complex topic. In a book, “Time matters: on theory and method”, dedicated to the core tools and procedures of scientific inquiry, Andrew Abbott (2001) attributes the "chance" factor a primordial role that influences and shapes the creation of knowledge.

According to Abbott, the intellectual and abstract world of a scientist is not disconnected from his daily routine and context. He examines how a set of ideas from an intellectual program unfolds in the life of an academic, and he attributes the "sequence" and "order" of ideas in any academic context a decisive role. Contrary to what is commonly assumed, “chance”, “coincidence” or “luck” are fundamental factors as well.

Abbott's detailed analysis opens fair arguments for the necessity of a deeper and wider understanding of the reasons and settings behind collaborative activities; beyond the careful measurement of data, it is necessary to understand the forces driving academics' attitudes (intentions, interests, obligations). It is to admit that human interactions cannot be understood only by the analysis of “flows” (trade, traffic, money).

Communication nowadays takes place through telephone calls or meetings in which a trip may be required, and these are parameters commonly applied to explain academic collaborations, including co-publications.

Recently, sociological analyses have tried to present novel forms of describing the traditional interplay among economic, cultural, geographical and scientific factors that influence the development of research collaboration. Often the object of these studies is to look at “social structures” or “patterns of social relations.” In this framework, “social objects” (i.e. people, events, organizations and cultural objects) are classes, and the patterns of relations among elements of a class, or between elements of different classes, are “social structures” (Hanneman and Shelton 2010). Again, there is a connection with the term “relations” when it is used to describe databases as the structure of objects connected by indexing attributes. Social network analysis is an explicit form of this view of social structures; however, it is still missing the relevance of institutional influence over collaborative behavior.

Other concepts, such as “events”, are controversial as well. They are interactions that have attributes, and are recognized by actors as having shared meanings. Thus, a research article is an example of the concept of an “event”. The article has attributes (such as length, topic, co-authors and citations), a name in itself, and a “social life”. But none of these parameters, attributes or characteristics is capable of assessing objectively the quality of the content of an article.

With respect to the spatial structure of collaboration, particular characteristics of each scientific field (for example, the level of difficulty to access international peer-reviewed journals) may distort the results of quantitative scrutiny (Hoekman et al. 2010 / Minet, 2017). This is the case of forestry in Brazil, which has a particular structure for information distribution and academic work dissemination, and in particular, in regards to local and regional aspects of research topics and goals.

Furthermore, almost no study in Information Science or in other fields of Social Sciences has approached aspects related to the unpredictability of social behavior (Said, Wegman, Sharabati, & Rigsby, 2007 / Kyvik, 2010). In a review on this topic, Jiadi Yao (2009) points to another aspect missing in studying the structure and processes of research:

> "No study considered the university structure and roles of each individual author." (Yao et al. 2009, p.06)

The notion above is especially relevant considering the current trend in social communication towards more collective interactions, networked organizations, and transdisciplinary and individual autonomy. As already established, communication based on individual freedom works like a “living system”, in which connections and procedures are changing and evolving very quickly and with unpredictable patterns (Van Reenen, 2006).

Therefore, it is reasonable to raise some basic questions, like: would ubiquitous and open source information help scientists' careers? In consideration of the institutional context in which scientists are immersed, are professors, researchers and students really changing their way of work because of new possibilities of communication through digital technology? Or is this a matter of convenience?

In order to describe and to analyze these questions, I decided to first explore the current meaning of scientific collaboration. My idea was that this would help me understand the changes happening.

3.3 Exploring the Meanings of Collaboration in Science

The book “Collaborating: Finding Common Ground for Multiparty Problems” by Barbara Gray (1989) asserts that collaboration processes are characterized by the joint and constructive exploration of different aspects of a problem, and allows the parties involved to go beyond their individual differences and limits when searching and implementing solutions. In general, the concept of collaboration is related to any activity in which people “work together to create or achieve the same thing” (Cambridge University Press, in McGinn, 1991 – p.: 126).

Reference to collaboration assumes it to be a property or feature that appears to have a "shared belief" of advantages (financial, structural and moral); the idea is that collective work can achieve something that is not possible through individual entrepreneurship. Furthermore, almost all kinds of collaboration have at least three main characteristics:

- They are formed by "autonomous entities"
- Their participants have some "common goals/intentions"
- They are based on "agreed principles" and "inter-operable infrastructure" (Camarinha-Matos and Afsarmanesh 2005, p. 441)

Ann Marie Thomson and James L. Perry (2006) add that collaborative processes involve autonomous actors, who interact formally or informally, in order to create rules and structures that govern their relationships. These processes depend on “shared norms” and “mutually beneficial interactions”, and they have two main elements:

- **Aggregative** - "manifested in formal organizational roles and legal contracts".
- **Integrative** - "manifested in personal relationships, psychological contracts, and informal understandings and commitments". (p.22, 23)

A contemporary definition of collaboration also considers its nonlinear nature, evolving over time, through participants' interaction. Thomson and Perry (2006) developed an earlier concept of collaboration, treating it as a cyclical process of formal and informal interactions, as seen in the figure below:

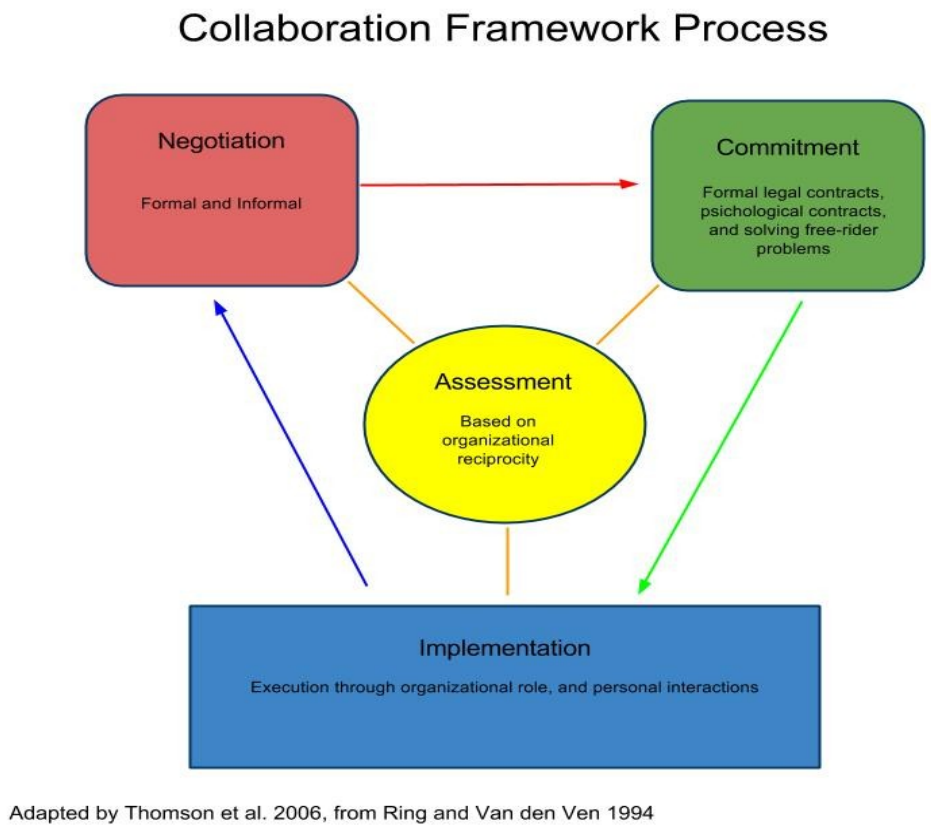

Figure 3 - Collaboration framework by Thomson and Perry. (2006)

Collaboration requires agreements on activities and goals, through shared “power arrangements." This encompasses the negotiation and commitment structured in the

figure above. This so-called "participatory governance" emphasizes openness in information sharing and the shared respect for others' opinions while negotiating agreements (p.:24).

Completely new forms of collaboration are also emerging from recent developments in virtual communication, which challenge conventional approaches. Two examples, the so-called "radical methods" of collaboration, like the "Open Notebook Science" (Lyon, 2009), and the "Electronic Lab Notebooks" (Symyx Technologies, Inc, 2009), are creating new concepts and ideas about how scientists can share, discuss and extend data, findings, tools and methods (McGinn, 1991 / Newman, 2000).

3.3.1 New Conceptual Framework for "Scientific Collaboration"

Information and Communication Technologies (ICTs) are promoting a complex change to the academic system (Nentwich 2005). This transformation includes functional/technical, institutional and individual factors, as well as cultural aspects, which are perhaps the most intriguing for the collaboration activities under analysis in this study. Regarding cultural transformations, epistemological changes and novelties are helping to build a more concrete image of the changes taking place.

New terms capture social, technical, and organizational aspects of scientific collaboration in the era of virtual communication. Others propose an ideological shift in the core concept of collaboration, which draws attention back to the intentions and goals behind every collaborative act.

The main premise of new technological contexts is the organizations that are likely to include the following characteristics:

- Geographically distributed
- Functionally and/or culturally diverse
- Interlinked by electronic communication
- Coordinated by lateral (non-hierarchical), and dynamic relationships

(DeSanctis, G and Monge - P. Communication Processes for Virtual Organizations. Organization Science, 10 (6). 693-703. 1999 – in NSF, 2008).

However, the reality of academic organizations may not correspond to this description above; therefore, the new terms for collaboration may not fully apply to the core definition for which we are looking. The variety of terms alone, without mentioning their meanings and possible interpretations, demonstrate

epistemological differences among disciplines. The overview of these terms below, gives an idea of the diverse frameworks already created to analyze this issue.

Cyberinfrastructure

The English Wikipedia (2012) has a complete and broad definition of this term: "The term describes the new research environments that support advanced data acquisition, data storage, data management, data integration, data mining, data visualization and other computing and information processing services over the Internet". In science, cyberinfrastructure is a novelty helping to efficiently connect data, tools, and people, with its main goal to facilitate the production of new theoretical and practical knowledge and solutions.

Cyberscience

First appearing in the scientific literature in the second half of the 1990's, this term relates to the use of ICT tools, especially networked computers, for scientific purposes. The book "Cyberscience. Research in the Age of the Internet" (Nentwich, 2003) asserts the pervasive impact of communication technology on the model, structures and output of the academic world. "E(electronic)-publishing" is the main aspect of cyberscience related to authorship and the production of scientific texts. Other manifestations of cyberscience are E-prints, E-journals, E-lists, E-mail and E-conferencing. These innovations promise a broad range of transformations in the entire scholarly communication system. According to Nentwich, an evolutionary path based on five possible relationships (Substitution, Superposition, Amendment, Expansion and Insignificant) may follow between traditional and new tools over time (p. 483). In the words of Michael Nentwich himself: "Cyberscience is not the study of the cyberspace but science and research in cyberspace or, termed differently, under cyberspace conditions." (Nentwich, 2003, p. 23)

Collaboratory

This term refers to the expression that emerges from collaboration in the laboratory. This term was defined as ''center[s] without walls in which researchers can work together regardless of physical location'' (Wulf 1993, in MIT, 2008 - p.3). "A collaboratory is an organizational entity that spans distance, supports rich and

recurring human interaction oriented to a common research area, and provides access to data sources, artifacts and tools required to accomplish research tasks" (Definition from a workshop at the University of Michigan, 2001 - in MIT 2008, p.03).

Connectedness

This is a mathematical measurement used in graph theory or in topological studies to calculate, for instance, clustering coefficients. After Mark Newman's work on the structure of scientific collaboration networks (2001), connectedness gained another application, when it was used to describe the degree of connection among nodes in a network. The most recent meaning of connectedness regards the personal, academic, partnership, and community connections people make based on seamless connectivity provided by today's electronic systems (Van Reenen, 2006). In other cases it appears in different variations using the core word, "connect". "Interconnectedness" (Nentwich, 2003 and Laitman, 2009) is one of them. Nentwich (2003) calls it "the degree to which the researchers in a field are linked by interpersonal networks" (p. 40).

Digital Academe

Digital academe is one of the newest expressions being used in the context of academic collaboration (Dutton/Loader, 2002 – In Nentwich, 2003 - P. 22). Although "digital academe" does not refer to any specific activity related to scientific and research investigations, it has been used mostly in the area of higher education, and more specifically, to describe distance learning.

E-Science

"E-Science" gained notability when it was first applied by the European Commission (2002) in a report about the activities of high-speed research networks. It directly relates to the development of information technology (Mittler, 2007). The acronym can stand for both - "Electronic Science" and "Enhanced Science". According to the book "Scientific Collaboration on the Internet" (MIT 2008), it can also be a synonym of "datacentric science" (p. 15). According to the German Wikipedia (2012), "E-Science aims to facilitate collaborative research that is carried out on the basis of a full digital infrastructure. This infrastructure integrates all relevant resources for a

research field and also provides tools for processing it" (my translation). A more bureaucratic definition says that E-science "is about global (networked) collaboration in key areas of science, and the next generation of ICT infrastructure that enable flexible, secure and coordinated resource sharing among dynamic collections of individuals, institutions and resources" (Camarinha-Matos and Afsarmanesh 2005, p. 441).

Free Science

The term "Free Science" refers to initiatives and approaches that aim to offer free access to scientific knowledge, such as through free of charge academic publications. The website FreeScience, for instance, offers 2023 books, mostly in the fields of Physics, and life and applied sciences, plus hundreds of learning materials and news resources. With an aim to become the largest free library of science, it is still in an experimental phase, and therefore, some ghost links and blank pages can still be found (e.g.:Forum). Arguing for an end of conventional copyright on scientific books that are older than fifty years, the site calls itself "an initiative to substitute real libraries for a virtual one". From this digital repository, it intends to allow the download of books and other material, in a printable format. Furthermore, the Free Science project argues that it is not convenient any more for scientists to publish their findings under closed and controlled environments, since it reduces the scope of such works, and limits visibility and potential of collaboration. The FREE (Federal Resources for Educational Excellence) initiative has a similar purpose. It consists of a repository and library of teaching and learning resources from the U.S. Department of Education. Launched in 1998, the portal contains more than 1,500 resources from dozens of federal agencies. Redesigned and relaunched in November 2006, FREE currently aims to involve academics in the development of teaching resources that can also be freely available on Internet. In more elaborate definitions, "free science" appears as synonym of "Free Community Science", which is a term inspired by the free software movement (FSM), and based on the same fundamental principle: knowledge contributes to society when it can be shared and developed by communities. Richard Stallman, the father of the FSM, refers to free science as follows:

> "The ideal of scientific cooperation goes beyond the conduct of individual projects. Scientific cooperation is also being reinvigorated today through the open-access movement, which

> promotes the public's freedom to redistribute scientific and scholarly articles. In the age of the computer networks, the best way to disseminate scientific writing is by making it freely accessible to all and letting everyone redistribute it." (Stallman 2005)

Open Access

“Open Access” is a political movement that aims to improve information management for academic purposes. There are few different views on the history of the Open Access Movement. The "Timeline of the OAM"[1], formerly the "Timeline of the Free Online Scholarship Movement", by Peter Suber is one of the most detailed accounts on the topic. It begins in 1966, when the U.S. Department of Education's Office of Educational Research and Improvement and the U.S. National Library of Education launched the "Educational Resources Information Center (ERIC)"[2]. As an online library of education research, ERIC pioneered some applications and principles that have been incorporated, three decades later, in the Open Source Software (OSS) philosophy. "...Open Source license reverses traditional licensing concepts by using the license to give the licensee more freedom rather than more restrictions" (Kierkegaard and Adrian 2010, p. 504). In 1993, with the advent of the World Wide Web, OA became a popular ideal to scholars and in scientific communities. Six years later, the promise of independent and direct distribution of academic material via the Internet has edged closer to reality with the establishment of the Open Archives Initiative (OAI), which is dedicated to the development of standards for webservers and repositories through the application of meta-data technology. However, it was not until December 2001, during the Budapest Open Access Initiative (BOAI), also known as Budapest Conference, that the Open Access Movement consolidated its plans and appealed to a larger audience. The opening sentence of this meeting, initially signed by only sixteen people, grasps the most important qualities and goals and the potential of the open access movement: "An old tradition and a new technology have converged to make possible an unprecedented public good."[3] Today, the document has over 5.000 institutional signatures, and has a distinguished strategy based on two distinct approaches: self-archiving and open-access journals (Suber, 2009). The most accepted definition of OA "allows anyone to copy, use,

[1]http://www.earlham.edu/~peters/hometoc.htm

[2]http://www.eric.ed.gov/

[3]http://www.soros.org/openaccess/read.shtml

distribute, transmit and display their work publicly" and to produce and to distribute derivative works, while respecting and properly recognizing the authorship of the original content (Singh 2005, in Bhat 2009, p.245).

Van Reenen (2006) lists some advantages of the OA:

- It is a powerful agent to increase citation and utilization rates
- It makes institutions, like universities, more transparent
- It produces a more stable and independent knowledge, since it works according to dynamic and democratic interactions

Open Research

"Open Research is seen here not only as means of sharing scientific knowledge and thus benefiting the scientific community; Open Research is interpreted here as a communicative measure which also reveals information about the individual researcher. This information is used to construct a subjective opinion about the researcher in question following the principles of constructivism for the purpose of making a collaboration decision" (Bukvova 2009, p.69).

Open-Science

On the English Wikipedia website, this concept redirects readers to the page on "Open Research", which is defined by its spirit for free and open source software[1], This definition also alludes to its flexible and broad interpretations, as Gibson (2007) notes, "The term [Open Science] is in intermittent and somewhat variable use." In his blog, Frank Gibson (2007) presents a more elaborate idea[2], saying that it "encompasses the ideals of transparent working practices... to share and further scientific knowledge. It can also be thought of to include the complete and persistent access to the original data from which knowledge and conclusions have been extracted". Open Science can also be found listed as a synonym of "intensive-data science", and is presented as "a continuum" that helps positioning the range of behaviors and practices observed in different disciplines and contexts (Lyon, 2009).

Radical Collaboration

[1] http://en.wikipedia.org/wiki/Free_and_open_source_software

[2] http://peanutbutter.wordpress.com/2007/06/26/do-scientists-really-believe-in-open-science/

One of the strategies through which Wikipedia gained its success is through "collaborating radically"[1]. Larry Sanger, the first Chief Editor of the former Nupedia project explains what the term means, as follows:

> "...Radical collaboration, in which (in principle) anyone can edit any part of anyone else's work, is one of the great innovations of the open source software movement... radical collaboration made it possible for work to move forward on all fronts at the same time, to avoid the big bottleneck that is the individual author." (Sanger 2005)

Wikis are considered the most popular "non-conventional form of interaction" that embrace the philosophy behind the Free Software Movement (FSM). Their application also raises two main issues in which to question. The first issue relates to the content developer's ownership and rights. The second discussion is regarding how to manage and to regulate the behavior of the users. Kierkegaard and Adrian (2010) explain the nature of so-called "derivative works" as follows:

> "The heart of wiki environments' appeal lies in their interactive nature. The fact that the contributor gets to engage within the environment and control the environment rather than just sit passively and watch is the difference between traditional audiovisual works and these new derivative works. The interactive nature of the audiovisual work comprising the wiki's copyright is relevant because they are a medium which presupposes and encourages some amount of creative, transformative input from the contributor" (p. 511).

This concept of collaboration, and in particular, the element of altruism involved, serves as the basis of the present research. The goal is to see how altruism manifests in academic environments and how it affects the creation of knowledge in research papers.

Scientific Openness

In the book "The morality of scientific openness" (1996), Munthe and Welin defined "scientific openness" as research in which "scientific information is freely accessible to interested parties". The term has merged from two behavioral concepts: access and participation (Lyon, 2009). However, through searches for this term on Google Scholar, the relationship that scientific openness has to issues of "national security after 9 / 11" are apparent, since half the search results are related to this topic. On ScienceDirect[2], a data-base containing a collection of more than 2.500 journals and over 6.000 books on different fields and topics, a search retrieved 27 documents for the exact search of "scientific openness". These documents are from a wide range of

[1] The fifth law of Wikipedia's success
[2] http://www.sciencedirect.com/

academic disciplines, including Biosciences, Biotechnology, Genetics, Molecular Biology, Medicine, Psychology, Economy, Political Sciences and other social sciences. Of these, publications from Biosciences, Political Sciences and social sciences account for most of the results. Security Studies is also highly represented, with five of the results from ScienceDirect on scientific openness on topics including "biosecurity", "bioterrorism", "international threat" and "warfare".

3.4 Changes in Writing and Publishing

Many have already identified the advent of Internet with the three main revolutions of human communication in history:

- Language (oral tradition) – Age of orality;
- Alphabet (literal tradition) – Age of writing;
- Print press (reproductive tradition) – Age of Print
  (Innis, 1951 / Wilder & Ferris, 2006).

One of the main arguments supporting the idea that humans are experiencing a paradigm shift in communication is related to the extent of the changes happening. From the changes in how people write, including the format, style and vocabulary, to the way texts are distributed and read, the cybernetic revolution is changing how society behaves, including how it deals with data, information and knowledge (Dechert, 1970).

In this new reality, traditional concepts like library, book, text and author no only have different character, they have different meanings as well. The author, for instance, has become an abstract grouping that cannot be reduced to the biology or psychology of a personality (Critical Art Ensemble, 2001). Similarly “library”, “book” and “text” are losing their physical meanings, giving rise to the digital representations of these dynamic and vivid entities. These changes demand a core change in almost all processes and structures related to the old concepts. (Postman, 1996)

Furthermore, all structures of the social system, and particularly those explicitly related to communication are desperately running to adapt themselves to this new reality. In general, these structures are transforming from a "hard" base to a "soft" base, which means that many processes and procedures are changing from their direct and physically present form, to a mediated and virtually represented one. (Capra, 2002)

Harold A. Innis (The Bias of Communication, 1951) is a pioneer in the examination of impacts of media over society. This Canadian historian first analyzed the effects of computer technology on academic writing and management, and through his investigations about the impacts of communication technology on ancient cultures, parallels can be made to what is happening today.

It is already well understood that writing, for instance, transformed the human consciousness, by changing the ways people think and express themselves (Wilder & Ferris, 2006). However, Innis (1951) went deeper in his analysis, into the cultural history. According to him, the emphasis on writing, which began in ancient Greek culture, was imposed mainly for political (law) and economic (commerce) reasons. This is reflected through the rise of an egoistic age today, with institutions aiming to meet the demands of individualism and cosmopolitanism, and the decline of the collective or public interest. This relates to the essence of our current way of certifying learning, to the origins of our current legal system, and to our current culture. As Innis points out:

> "Verse and prose which had been read aloud and in company to the third and fourth centuries declined. Reading without moving of the lips introduced a taste and style of its own. The ancient world troubled about sounds, the modern world about thoughts. **Egoism replaced an interest in the group**". (p. 14).

According to Harold Innis, any technological bias is a result of established power structures. In the case of knowledge monopolies, he warns of broad and harsh consequences, as follows:

> "Mechanization has emphasized complexity and confusion; it has been responsible for monopolies in the field of knowledge; and it becomes extremely important to any civilization, if it is not to succumb to the influence of this monopoly of knowledge, to make some critical survey and report. The conditions of freedom of thought are in danger of being destroyed by science, technology, and the mechanization of knowledge, and with them, Western civilization" (p. 190)

Nowadays, the revolutionary process has both negative and positive effects. On the one hand, digital technology offers a way to distribute content to the public and for the public with unprecedented efficiency (Van Reenen, 2006); initiatives like Wikipedia may eliminate the “big bottleneck” in knowledge distribution created by individual authorship (Sanger 2005). On the other hand, the reinforcement of the individual, though private entities (such as social software) has provoked an over appreciation of the individual perspectives and judgments (Brodahl, Hadjerrouit, & Hansen, 2011).

Writing and publishing were innovations that sanctioned religious authority (Innis, 1951 / Postman, 1993), and web sharing may represent a return to the origins of social interdependence and democratic belief in human civilization, to a time when science, art and spirituality were together (Mao, 2008). Michael Nentwich (2003) cited three possible impacts in research substance from communication technology:

- Methodology = new ways of producing results (e.g. distributed computing)
- Work modes = new know-how (e.g. remote collaboration)
- Knowledge representation = more transparency and connectivity (e.g. hypermedia)
  (Nentwich, 2003 - p. 62 & 63)

The last point is of special concern for writing, since it promises to transform the relationship between authors and their work. This change resets the nature of scientific work. Like the invention of paper, which induced a revolution that motivated several other developments, the Internet promises to transform all political, economic and cultural structures of society. This ambition includes our universities, and the way academic texts are written (Critical Art Ensemble, 2001 / Wilder & Ferris, 2006).

It is well understood that the publishing industry is changing quickly. However, instead of the number of printed and non-printed materials and the magnification of their diversity (McGown, 2011), it is the qualitative aspects of content production that still urgently need further studies (Sanger, 2005 / Senna da Costa, 2006 / Gonçalves, 2006 / Foster et al., 2007 / Menand, 2010 / Bollier, 2011 / Tochtermann & Siegfried, 2014).

In practice, many things have already been transformed, including the division of work, and the activities involved in writing and publishing. The diagram below (Senna da Costa, 2010) illustrates the different tasks that were once clearly separated by infrastructure or professional categories in writing.

Figure 4 – The author in the online culture (Senna da Costa, 2010)

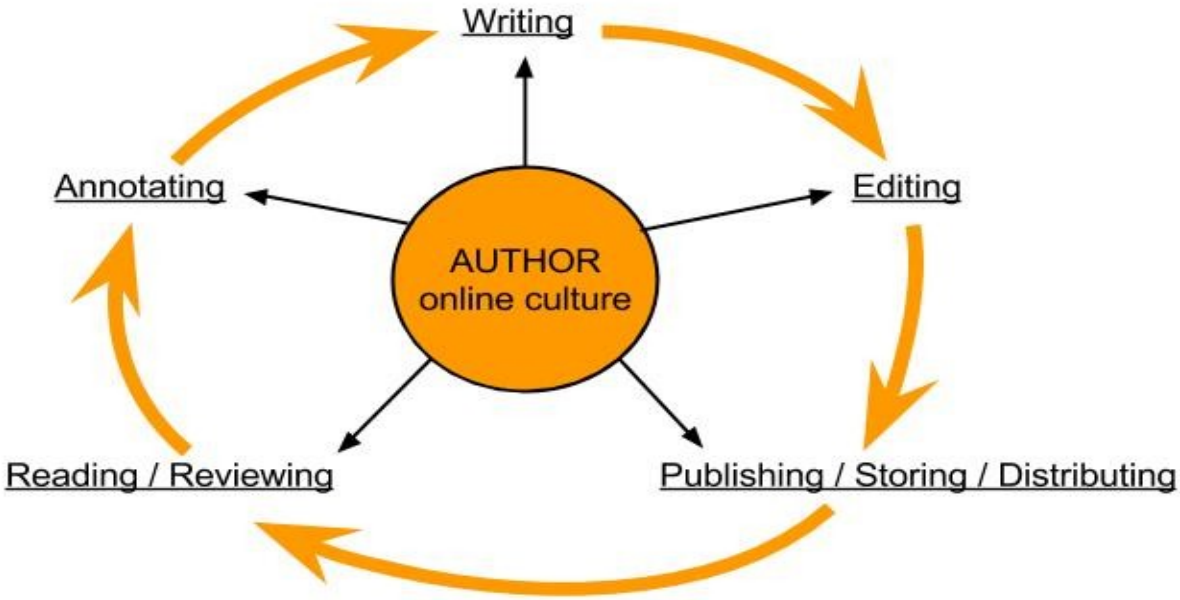

Illustration 3: Workflow for digital publishing, the same person is now empowered to perform all tasks formerly separated by infrastructure, professional categories and social boundaries.

These divisions have become less clear or irrelevant due to the advent of digital technology. Today, one single person can perform writing, editing and publishing. Furthermore, the reader has been empowered by technology to take part in the content construction and improvement (Nentwich 2009).

Tools like Google Drive require an appropriate framework, including a specific ideology, which supports the transformation of research practices and attitudes. Instead of reinforcing control over expert knowledge, this kind of technology facilitates shared experiences of knowledge creation. In many cases, such tools are altering power relations in academic environments and promoting a critical attitude towards authority (Rowe, Bozalek, & Frantz, 2013). The same is being said about Wikipedia and its model for communal shared knowledge. The collective wisdom it promotes, challenges traditional relationships between humans, texts and information, including creation, ownership and credibility. More importantly, such communication technologies are transforming our notions of authority and trust of knowledge (Wilder & Ferris, 2006).

From a spatial perspective, platforms such as Wikipedia can be described as a “co-located” or “multi-local” type of collaboration. Nancy Foster and her colleagues put the issue as follows:

> "In this electronically connected environment, many different kinds of tasks can be performed from the same location, and the same task can be done in different locations." (Foster et al. 2007, p. 67)

The question that remains unanswered is to what extent science will take advantage of the new technology in order to improve its practices. As Michael Nentwich (2009) points out:

> "Web 2,0 applikationen ermöglichen es den NutzerInnen, selbst und unkompliziert zu AuthorInnen zu werden... Das bekannteste Beispiel ist Wikipedia, die auch von ForscherInnen täglich aktiv und passiv genutzt wird..... Während 2009 kein Zweifel bestehen kann, dass Cyberscience (1.0) längst Realität ist und in vielen Bereichen die traditionellen Weisen, Wissenschaft zu betreiben, abgelöst hat, stellt sich in Hinblick auf die neuen Dienste des Web 2.0 erneut die Frage, wie viel davon für die Wissenschaft funktional sein und sich in der täglichen Praxis durchsetzen wird...” (p. 02)

Johann Bachinger, researcher-agronomist at Leibniz-Centre for Agricultural Landscape Research (ZALF), raises another aspect of the issue between communication technology, and its advantages for scientific activities. In a face-to-face interview in September 08th., 2006, he pointed out:

> "My doubt is how can I create an "additional knowledge" using sophisticated, digital communication technologies for exchanging communication?"... I am surprised the way the Internet really quickly became an intermediary tool between people and information. But I'm still questioning, when I am working together with someone else, how these tools can help in building trust and credibility... I need to sit down with the people I am working with in order to have a dialog and build mutual confidence". (Senna da Costa, 2006)

Mentioning non-verbal communication, Dr. Bachinger wondered if this new technology can produce additional knowledge, or simply a more efficient method for the exchange of thoughts. He questioned how the virtual communication could make his learning process more effective.

The successful application of tools like Google Drive seems to be, above all, a cultural matter. The impacts of such tools in scientific writing and publishing have only been tested in small local experiments; therefore, they are still too speculative. However, recent studies show that such Web 2.0 tools continue to be broadly marginalized by universities' administrators (Brodahl, Hadjerrouit, & Hansen, 2011).

Disruptive technology

For the present investigation, more important than the potential improvements needed in new communication technologies, are the potential disruptions to current structures. Collaborative platforms, for instance, are not different only from a technical point of view; they also deal with prior problems of the content production and sharing. Successful collaborative platforms have distinguished philosophical and ideological approaches to information and authorship (Sanger, 2005).

Collaborative writing is a form of authorship that challenges the myth of the “solitary act” of writing. Although it is now commonly accepted for Wikipedia texts, it remains very controversial in academic literature, and specifically in regards to work credibility and ownership. On the other hand, collaborative writing can offer a more honest and transparent form of creation in the academic sphere. It is an ongoing process of “polyphonic dialogue”, where intellectual property is a second order concern, which possibly indicates an ideological shift for successful application of collaborative writing (Sveum, 2013 – p.216).

It is not a surprise that most academics, even in Information Science, still misunderstand the concept of collaborative writing. Co-authoring, for instance, is mostly performed using one Word document that is sent back and forth between authors over E-mail for review. Working together simultaneously on a single and unified text is a very rare situation for academics in most disciplines, especially in the social sciences and humanities. Furthermore, particularlyin consideration of the increasingly competitive market, there is little incentive in the current reality of academic publishing to undergo critical analysis of the aspects that condition the current academic framework (for example, timing, roles, curricula and grades).

This results in a paradoxical context for collaborative activities in science. On the one hand, there is a fundamental belief that sharing attitudes improve the learning experience. On the other hand, the most preferred and common form of communication in academic writing is still face-to-face conversation, supported by documents sent through e-mail. This confirms that the traditional framework for authorship, based on individual merit and performance still prevails. All of this also reflects the perceptions that academics hold regarding the advantages of collaborative writing. Tor Sveum (2013) summarizes:

- Sharing knowledge and perspectives results in improved quality on texts and analysis; (Side effects: Confrontation, disagreements and personal conflicts / Language barriers / Compromise and giving up control;)
- Editing and reviewing texts, especially with more experienced researchers and professors, functions as a training process for writing scientific papers. (Side effects: Coordination of different writing styles / Inadequate communication and misunderstandings;)
- Multiple approaches and perspectives are more efficient in dealing with details of complex issues, what is a core characteristic of the innovation process. (Side effects: more and different perspectives or ideas can make the analytic process more complex and chaotic;)
- Efficient distribution of tasks and responsibility leads to faster work accomplishment.(Side effects: time management problems;)
- Increased interaction and networking. (Side effects: power issues, ex.: negotiating author order.)
  (Sveum, 2013 - p. 220)

It is possible to judge such backwardness concerning the adoption of new practices and concepts a cultural inertia towards communication technology. Despite the sophistication of tools already available, habits and behavior regarding writing activities continue to follow a traditional form based on individual performance and institutional hierarchy. Even when one admits that collaboration is fundamental to academic research and publishing, it is still hard to prove that two heads are always better than one when writing a paper (Sveum, 2013).

Jimmy Wales, founder of the Wikimedia foundation, once[1] argued that the failure of the Nupedia Project (the project that preceded Wikipedia) has little to do with the limits of technology. He gives a hint about the extent of culture clash at stake:

> "Contributing was not fun for the contributors. First, the editorial control system was intimidating, because when you submitted something, it would be sent to professors for evaluation and comments, and then you would have to revise based on that. Second, the process was not social, but solitary. “
> (Senna da Costa, 2006)

Maybe they cannot see the value of free contributions, which is related to our current authorship model. Wikipedia and Google are two of the famous, though controversial, examples of a “disruptive technology”. In addition to their innovative purposes, they are cheaper and much faster than other commercial solutions previously offered by well established companies. But beyond the economic incentives for their work, it is the impact of such technology on social and cultural

[1] E-mail to me on September 06th., 2006

attitudes that are of special interest to our current academic institutional structure (Bell et all. 2007).

Until now, services offered by disruptive technology, like Google (e.g. Google Drive and Google Scholar), complement the infra-structure available at universities. While sometimes they can replace specific functions, instead of threatening the whole institutional status quo directly, these innovative initiatives are prompting internal debates about the focus and scope of educational institutions as a whole (Postman, 1996; Dempsey, 17/10/2010).

Wikipedia's success helps again to understand this situation. Recent literature shows that volunteered co-authorship can provide high-quality content in all levels of instruction in any subject of human knowledge. Furthermore, Web 2.0 tools, like these, can alter the way students and teachers think and work; their application supports a structural transformation of the learning experience, including implementation of a more “student centered” and “inquiry based” curriculum. Such “non-linear approaches” to collaboration enhance critical thinking, and naturally challenge existing practices and beliefs of the educational establishment (Chu & Kennedy, 2011 – p. 582 to 585).

The absence of mechanisms to manage and provide feedback about these collaborative activities demonstrates the lack of formal recognition of the importance of this new reality. Compared to the improvements for the dynamics of scholar communication (e.g. student-teacher relationships) promised by the application of collaborative writing tools is still relatively unexplored. The use of learning assignments, such as GoogleDocs, demonstrate overwhelming approval by undergraduate students (79%). The same study detected the impact of such tools on the means of communication between scholars, but it does not further investigate the extension and depth of the effects (Zhou, Simpson, & Domizi, 2012).

In terms of the institutional aspects affected by disruptive technology, it is interesting to note the convergence of science's biases and the revolutionary breakthrough of computer based communication. This technology, has furthered many initiatives that aim to improve the scientific knowledge management model, among the most important being the Open Access Movement (OA).

Almost all of the developments that paved the way to OA arose in academic environments, usually backed by governmental funding. It is suitable to claim that the emergence of Open Access was a side effect of academic and governmental initiatives that were pursuing improvements and alternatives for academic communication (Suber, 2009). However, not until 1993, with the advent of the World Wide Web, did OA became a popular ideal for scholars and for the general public. Six years later, the dream of independent and direct distribution of academic material through the Internet came closer to reality with the establishment of the Open Archives Initiative (OAI), dedicated to the development of standards for webservers and repositories via the application of meta-data technology.

The adaptation of the scientific publishing market is driven by their demand to survive. Elmar Mittler (2007) provides a very succint summary of the different forces and issues present in this debate:

> "Ohne den Auf- bzw. Ausbau einer internen wissenschaftlichen Informationsserviceinfrastruktur ist die Wissenschaftskommunikation der Zukunft nicht möglich. Das heißt allerdings nicht, dass die Verlage verschwinden sollen oder werden. Als Aggregatoren und Produzenten von Mehrwertprodukten, die eine weite Verbreitung wissenschaftlicher Erkenntnisse fördern, sind sie weiter hoch willkommen. Der einzige Trend, der sich dabei möglicherweise hindernd in den Weg stellen könnte, ist die Kommerzialisierung des Open Access nach dem Geschäftsmodell von Google" (Pg. 169).

Google is an important new player in the field of collaborative academic communication as well. We have reached a time when most inquiries show no significant difference between Google Scholar and traditional library resources (Howland, Wright, Boughan, and Roberts 2009). Other studies highlight the advantages of Google Docs when applied in learning activities. According to Zhou, Simpson, & Domizi (2012) the main qualities of the tool are:

- Shared work-space;
- No limitation regarding timing and distance;
- Structured exchange of ideas and insights;
- Free of charge. (p. 359)

However, the studies about the impacts of these products on the behavior of scientists are either incipient, or have an apologetic character when they promote the adoption of Google tools for academic profiling and marketing (Brigham, 2014). The game of scientific publishing is still being played, and there is no clear definition of winners and losers. Nonetheless, some trends can be taken very seriously. Independently from its tactics (Golden, Green or Grey Road), for academic

purposes, OpenAccess needs "to facilitate the unrestricted access to scientific knowledge, which is a prerequisite for effective and efficient research..." (Berger, 2007 - Pg. 174).

The idea is to understand why these kinds of initiatives have not prospered in scientific environments, which could create a free flow of information, moving through many different directions at the same time. In theory, virtual environments would facilitate contact, communication and exchanges of information among fellow academics. Douglas Engelbart (1962), one of the pioneers of technological developments for new media communication, argued that human-computer interaction has potential to make people “work together more effectively” (in Kim, 2004); however, it is evident that it is not working like that in practice.

The focus here goes beyond whether individual academics are, or are not, using these new technologies or taking part in such digital collaborative initiatives. The question is, how this very target group is applying such tools and systems, and more importantly why are they doing so in such ways? Despite being an approach that tends to be problematic for the classification of isolated issues, a method that looks at the reasons behind acts gives a broad and concrete idea about the manifestation of a situation that is intertwined within many aspects of academic context (cultural, institutional and technological).

3.5 Understanding Problems of Collaboration

Some authors still refer to the collaborative process as a "black box" (Thomson & Perry, 2006), as the interactions among academics are understood very little. In 1995, Baldwin and Austin (1995) did a seminal work using similar, ethnographic methods used in the present research. They had eighteen Higher Education scholars to complete a semi-structured questionnaire, which also encouraged them to “tell their stories” of collaboration. The interviews used for the study covered the following topics:

- Process of collaboration
- Roles of collaborators
- Problems or challenges
- Strategies of solution
- Positive and negative outcomes
- Advice regarding better practices

(p. 50)

The answers were organized in five categories:

- Characteristics of the collaborators and their teams
- Metaphors to describe faculty collaboration
- Toward a grounded theory of collaboration
- Individual attributes
- Contextual factors
  (p. 56)

The category of “Toward a grounded theory of collaboration” found the following criteria regarding the "dynamics of collaborative relationship":

- Degree of “jointness”
- Definition of roles and responsibilities
- Flexibility of roles
- Similarity of standards and expectations
- Proximity of partners
- Depth of relationship
  (p. 58)

Beyond confirming the uniqueness of each collaborative relationship, the study finds that “individual attributes” (including race, cultural heritage, gender, career stage and professional status) and “contextual circumstances” are the main factors that affect collaboration. For the present research, there are two subdivisions under “contextual circumstances”:

- DISCIPLINARY = modes of operation, paradigm development, resources, technological base, collaboration conventions and policies
- INSTITUTIONAL = values and priorities, evaluation criteria, reward system, incentives for collaboration, resources for collaboration, policies on collaboration

Urging academic administrators to recognize the importance of collaboration for creative and innovative research, Baldwin and Austin (1995) warn of "a common pattern of institutional practices” that sticks to the status quo.

> “Institutional ambivalence toward collaboration and the absence of clear guidelines for collaboration seem to be fairly widespread". (Baldwin & Austin, 1995 - p. 64)

Paradigm shift

According to Camarinha-Matos and Afsarmanesh (2005) the current stage of transformation in communication technology can be considered to be, what Thomas

Kuhn (1996) would call, pre-paradigmatic. The current phase is one in which collaborative phenomena continue to be approached differently, and sometimes in contradictory ways, depending on the research field.

The "multidisciplinary nature" of collaborative networks amplifies the tension brought by the emergence of the new paradigm, as traditional disciplines compete against new areas of organized knowledge to master the technology. Camarinha-Matos and Afsarmanesh (2005) refer to this clash of disciplines over collaborative concept as a "fragmentation of research" (p. 445).

Among the most distinctive problems involved in furthering collaborative activities, is the contradiction of the philosophical / epistemological views within the scientific process itself: despite the value that the publishing system places on the individual effort of authors, there is a broad acceptance of the idea that science is done only as a communal activity (Kuhn, 1996, Popper, 2006).

Issues of technological transformation (McGinn, 1991) are another relevant player in this situation. For example, Nentwich (2003) refers to the potential “lack of quality control” (p. 60) in research output (e.g. scientific papers), and defends the need for further in-depth analysis about the transition from traditional to digital publishing.

The barriers posed by the institutional divisions between scientific disciplines to collaboration (Abbott 1999), outweigh the hurdles presented by new modern communication tools. These divisions are the structures behind "traditional habits" of communication. Furthermore, disciplinary separation has evolved into cultural separation between departments, which has led to the development of distinct norms, methods and paradigms (Kuhn 1996; Piaget 1971).

National and regional contexts only add to these institutional and cultural barriers and differences, including patterns of co-authorship and collaboration. These contexts also refer to differences in entire science systems, with their particular borders (geographical, political, economic, social and historical), and explains one reason why the majority of research projects continue to be carried out along national lines (Hoekman et al. 2010).

The means to assess collaboration have evolved for decades. In 1991, Wood and Gray asserted that a lack of reciprocity among collaborators may produce the reduction of their commitments. However, such a response would also depend on

other factors, like “joint decision making”, “mutuality”, “trust”, and “tension between individual and collective interests” (in Thomson et al. 2006).

Thomson et al. (2006) propose five key dimensions to evaluate collaborative processes. Each one has with distinct variables, and they are not linearly interdependent from each other; in other words, the variation across each dimension is influenced by the others' variables. They are:

- **Governance** (structural dimension - joint decision-make process on "negotiation" and "commitment")
- **Administration** (structural dimension - clear roles, responsibilities, boundaries, concrete achievable goals, and good communication during "implementation")
- **Organizational Autonomy** (agency dimension - contrasts shared control with individual control in the entire process)
- **Mutuality** (social capital - Without mutual benefits, information sharing will not lead to collaboration.)
- **Norms of Trust and Reciprocity** (social capital - Perceived degree of obligation - "I will if you will".) (p.: 23-28)

Other factors like “internal and external relationships”, “multiple accountability”, “ambiguity” and “uncertainty” also influence the core dimensions. Thus, the equilibrium among the key dimensions depends on each situation and context, as well as the individual perception and interests of each partner. In other words, collaborative settings rest in finding the right combination between administrative capacity (coordination) and capacity to build relationships. (p.:25)

For Ostrom (1998), the likelihood of collective action is determined by three core factors (reputation, trust and reciprocity). In order to effectively foster collaboration, these factors must function as complementary or be commonly shared, beyond individual or institutional objectives. There must be interdependence with a homogeneous view regarding moral imperatives. Thus, truly collaborative management is based on more symmetrical, homogeneous, and horizontal relationships. Ostrom (1998) concludes that traditional management, based on “hierarchy”, “standardization” and “routine", is not effective in such contexts (Thomson et al. 2006). This understanding helps to explain some of the greatest problems targeted in the present investigation.

In this regard, it is possible to clearly identify two opposing attitudes in scientific environments: “individualistic/egoistic” or “altruistic/collectivist”. They appear in

individuals' behavior, institutions' policy, and cultural contexts (Raymond, 2001 / Maniates, 2003 / Laszlo, 2004 / Jackson, 2009 / Laitman, 2009 / Magdoff & Foster, 2010 / Azzi, 2013).

Obstacles presented by current notions and regulations of intellectual property are seen as one of the biggest hurdles to scientific collaboration. The norm for a programmer, for instance, is not to distribute their software's coding, as a strategy to prevent competitors from accessing the development process. However, this option depends on the environment, but for simply competitive and commercial purposes, it can be an option. In fact, it is the possibility of violating intellectual property that prevents authors and programmers from spending time promoting or creating based on the written works of somebody else. In a more collaborative context, this logic may be seen as an obstacle. (Brooks, 1995 / Kierkegaard and Adrian 2010).

Technology can also be an enemy of progress and development, depending on the ideological framework of the analytic context. In medical affairs, for instance, among other existential issues, the notion that there is no illness that cannot be cured by technological advancement has been addressed as "big lie". The idea that technology reduces medical care costs has now also been counted as misleading (Shriver 2010, p.626).

Since multimedia is not simply the sum of all possible output and input channels, the task becomes much more complicated. Different readers need different strategies (including styles, information and indexes). In fact, with the advent of new communication technologies also requests new approaches for learning. Before, it was never so important “to learn how to learn”, when there was a stable collections of “confirmed” knowledge presented by professors in a classroom. It is also a matter of a shift towards a culture of inquiry, which is a core issue in schools nowadays. Asking questions demands time, patience and tolerance, for both who is questioning, and who is supposed to answer (Innis, 1951 / Maniates, 2003 / Gross & Frickel, 2005 / Schnittman, 2010 / Brodahl, Hadjerrouit, & Hansen, 2011 / Falconer & Noy, 2011 / Rowe, Bozalek, & Frantz, 2013).

As Harold Innis suggests:

> “The universities should subject their views about their role in civilization to systematic overhauling and revise the machinery by which they can take a leading part in the problems of Western culture. For example, we should extend our scholarships to universities on the

> Continent. Lecturers should be encouraged to write books as a means of compelling them to give new lectures. The universities must concern themselves with the living rather than with the dead." (The bias of communication, 1951 - p. 195)

Furthermore, Van Reenen (2006) notes that there is an "emergent complexity" in academic environments. This is the result of the new academic reality of communication processes where stable patterns and procedures have now split into many dynamic new forms of information production, management and distribution. This increase in complexity also includes faster changes in connections and procedures, and sometimes in unpredictable patterns.

Above all, Open Science is a counter force against the monopolization of knowledge. Its practices, which aim to enable the free licensing of technologies and open access to scientific texts, are consolidating in all continents. The very concept of a hacking culture promoted by activists who fight for the freedom of knowledge is an expression of a conflict that is only beginning (Silveira, 2014).

A general evaluation of the potential of "open science" commissioned by the JISC point out, for instance, that radical open science methodologies are currently on the “fringe”, and there is no guarantee whether their usage will increase in academic disciplines and environments. The challenge that they identify involves an intricate matrix of factors, including awareness, understanding and interpretations of abstract concepts related to “openness” (Lyon 2009).

From this case study, it is fair to claim that although there is already affordable technology to improve the academic communication, which has been improved along the way, the academic establishment is still tied to an individualistic idea of expert content (and therefore, knowledge production). Again, the MIT's book on the topic refers to the issue as follows:

> "...important research continues to be conducted by a single scientist, but collaboration has become a critical feature of science, although it also represents a challenge in which it concerns organizational and social matters” (Olson, Bos, & Zimmerman, 2008 - p.2).

Schnittmann (2010) has made an interesting point in an article[1] on his weblog, in which he attributes the difficulty academics have in overcoming their "linear experience" with the "print legacy" to the lack of ability of educational institutions to adapt their systems of teaching and carrying out research to the opportunities that digital tools present. Technological developments is another issue involved, but it is

[1] http://www.blackplasticglasses.com/2010/03/23/digital-reading/#more-445

far less important than the internal structure of academia, argues the man responsible for digital partnerships and licensing at Oxford University Press. He refers to this as follows:

> "...There will be plenty of success for platforms and products such as the iPad and the eDGe. However, their level of success will be limited to the commercial viability of digital pedagogic reading – not the true potential that digital learning holds." (Evan Schnittman, What's next in digital reading?, 23/03/2010)

The provocative inquiry can be accompanied by an analysis from the "mathematical ecologist" from the Harvard School of Public Health, Richard Levins (2010). His text broadens and deepens the debate around the influence that our social contexts have over academic structures. For the present work, the "institutional fragmentation" and the "enclosure of the intellectual commons" mentioned by Levins, should be highlighted.

According to Levins there are at least three influential levels operating in these issues:

- The political economy of the academia
- The institutional organization of the knowledge industry
- The intellectual biases and constraints, especially present in expert contexts

Regarding the "political economy" he refers to the current core logic of capitalism, noting that all goods and services are commodities to be sold in order to make profit. This logic evolves in specific aspects in academic publishing, such as the "rules for recognition", "academic promotion", "standards for funding", "time limits for degrees" and "definitions of the domains of journals".

For the "institutional organization" level, Levins (2010) points to the treatment of knowledge as a "product", with an owner. Its industry, that owns the knowledge product, defines its "vocabulary", its "acceptable theories", its boundaries of legitimization, its market rules, its "research agenda" and its "taboos".

The "intellectual biases and constraints" relates to issues already mentioned by several philosophers and science theorists, who note that expert knowledge has problems in challenging its own methods and paradigms (Popper, 1945; Kuhn, 1962; Foucault 1969; Piaget 1971; Feyerabend 1975; Postman 1992). In other words, despite “science's pride" in its self-correction mechanisms for catching errors,

scientists still have no means against shared biases of their whole community (Fanelli, 2010).

In the end, even the effort to protect the integrity of academics are reinforcing the limits between fragments of the hierarchical structures of disciplines and their institutions. Richard Levins summarizes the topic as follows:

> "Science boasts of being self-correcting. But the correction of the inevitable errors, an essential part of the development of knowledge, is prevented or retarded by generic conflict of interest. In recent years, the professional journals and universities have recognized generic conflict of interest: situations in which researchers have economic stakes in the outcomes of their research that influences their reports and determine what to include and what to withhold. Scientists might be shareholders in corporations whose products they defend, or receive fees for testimony in court against claims that a chemical or physical exposure is harmful, or win grants for sponsored research, or they may be courted with invitations to lecture in delightful places and paid with generous honoraria, or they may prescribe treatment at their own private clinics." (Monthly Review 2010)

The final argument about what shapes current communication practices is the nature of individual scientists. A practical explanation is given by Robert McGinn (1991), to whom "the scientist is not a 'selfless' creature". Among the "less pure" motivations of scientific activity he lists:

- Social prestige
- Competition spirit
- Desire for memorial tribute
- Desire for pecuniary rewards
- Help to meet a need of society
  (pg. 04)

The goal of the present work is to examine possible consequences of the most recent communication technologies on the publishing culture in scholarly contexts. Among all elements to be considered and studied in the concept of scientific collaboration, the human interactions are still the most challenging. However, some factors play a decisive role, which help to produce a more structured analysis of the topic.

Information literacy

Information literacy is a key issue in the context of E-scienc. Specific problems, such as missing information literacy skills in students and professionals, can be explained by a combination of aspects. The links between information literacy, scientific inquiry and the generic research process are indeed very important for educational institutions.

In a review of studies on the topic, Andrew Shenton (2009) evaluates a "regrettable" lack of importance attributed to information literacy in academic contexts. In particular, Shenton notes that activities that may lead to the acquisition of information literacy "are frequently undermined" by habits and procedures prioritizing other issues, specially those concerned with institutional administration. His conclusion is almost a manifesto for communication improvements in academic institutions:

> "Until the divergence between key features of information literacy and these longstanding practices is remedied, the task of inculcating the core skills in different contexts is likely to prove problematic" (Shenton 2009, p. 231).

Information access

Increased restrictions in access to information is a recurrent problem caused by institutional policies in many forms. Two decades ago Paul Pedersen (1989) from Syracuse University identified a trend toward access restriction to scientific information in the United States. He highlights the lack of studies and analysis of the implications of such phenomena throughout time, especially in regards to the philosophy of science.

The definition of scientific information as intellectual property is a fundamental element prompting such a trend. It is called a “tradition of secrecy”(p.491). Furthermore, the proprietary approach immensely influenced the regulation of academic activities in other countries, especially in less industrialized.

Despite "social priorities", Pedersen saw an inclination in academic contexts to privilege individual and institutional interests. This is known as one of the most common biases of modern science and could indicate that the interests of researchers, universities, governments and society no longer coincide. According to him, “restrictions” in the exchange of information in international sphere signal this scientific failure. In summary, the reason is:

> "The management of truth by scientists for solving problems scientifically is not always in harmony with efforts to manage truth according to the social and political consequences of the truthful statements. (p.486)

Citing attempts by governments to restrict the exchange of scientific knowledge, Paul Pedersen (1989) describes how national trade (private property) and military (national security) interests have been used to control university research. Nationalist discourse is usually present in these attempts and the restriction of information, or even access to knowledge infrastructure, has been justified as an

issue of strategic national interest. The loss of public confidence is among the effects on an institution's credibility.

Institutional policy

The distant and decisive bureaucracy of permission is another problem for academic communication and collaboration. Education and science are based on strong institutional structures, whose functions rely heavily in such "permission systems". The suppression of creativity is an impact of a bureaucratic approach to science. In a relentless summary:

> "After a few rounds of this, you become good at guessing what commissioners will like, and following some dedicated networking, you discover what the channel priorities really are. You learn how to craft ideas that will have the right mix of buzz and relevancy and risk, and you're rewarded with commissions. In short, you've become an expert at creating mediocre ideas to order." (Hon, 2011)

Adrian Hon (2011) describes the current academic system as "arbitrary" (in terms of hierarchy), "trend-driven" (in other words, an oligopoly), "risk averse" (or, conservative) and pervasive. In other words, in order to do science today, any individual must firstly become part of the established system.

This describes an obvious cause of another institutional problem for collaboration: a lack of incentives. This includes incentives to cultivate collaborative attitudes among academics, and incentives for developing collaborative infra-structure.

Through an investigation of nine OA repositories in Computer Science and Information Technology, Mohammad Bhat (2009) revealed a lack of incentives and policies regarding the maintenance and expansion of digital libraries. Among the recommendations made by the author, are:

- Institutions should take steps to self-archive their research output, as self-archiving mandates are more effective than voluntary policies
- The repository for the work should be properly promoted and publicized in seminars, lectures, talks, e-mails to authors, etc
- To control the quality of the documents submitted, there should be a provision for peer review of submissions which have not gone through this process earlier.
  (Bhat 2009, p.255)

Context ideology

The paradox between the potential and threat represented by the application of ICTs on scientific activities is apparent through the case of OA. On the one hand, there is

huge potential to increase and qualify participation and collaboration. On the other hand, there are important issues yet to answer, such as those regarding privacy and intellectual property (Lyon, 2009).

With a political and economic perspective, the promised freedom possible with new media tools can also be perceived as a threat. Virtual communication liberates information and destabilizes the entire structure in which business and governments traditionally work.

The copyright crisis serves as an example (Die Tageszeitung, p. 04, 06/07/2007). While digital platforms are making communication more flexible, they are also weakening the credibility of specialized information that is freely distributed. In other words, the traditional form of information distribution appears to be tightly connected to the value of information, which can be a barrier to establishing a more open and free approach to specialized information management.

These remain paradoxes in the knowledge industry. The current approach to knowledge of academic institutions is still too elitist to accept a truthfully public evaluation. This discussion refers to organizational culture (Wood Jr., 2013), which is also changing through the evolution of communication technology. In the “iceberg of culture” (Van Muijen, 2013), which refers to traditional values or innovative values, one of the most controversial issues of the cultural aspect of communication is the ethical commitment at the work place (Critical Art Ensemble, 2001).

3.6 Assessing Collaboration through Co-authoring

In order to investigate the impacts of new communication technology over academic activities I decided to look for concrete forms of scientific collaboration. Furthermore, as the focus of the research lies on the interests and motives behind the decisions taken by scientists to collaborate, the co-authorship of texts offers complete and profound insight into real situations of academic collaboration.

Co-authorship is one of the most common collaborative activities in academia, in terms of frequency, volume and intensity, which are the main parameters that indicate an increase in "collaborative efforts" (McGinn, 1991). However, it still one of the most controversial topics among academics, publishers and university managers (Said, Wegman, Sharabati, & Rigsby, 2007 / Beigel, 2014).

The use of computers for academic purposes is at the root of some very significant, recently achieved advancements**.** On a more sophisticated level, computer systems can be used to analyze the interpersonal relationships among co-authors, a kind of "sociometrics" (Dechert, 1970 - p.32), used to assess and to evaluate human relationships, and academic performance. In the current scholarly publishing culture, one such application is known as Bibliometrics, or Scientometrics.

Scientometrics (or Bibliometrics) is a set of quantitative techniques used to assess scientific papers and publications according to their statistical outputs. These techniques are used to determine the influence of a writer (e.g. H-index), or the impact of a publication in relation to their citation records, number of articles and periodicity of a publication. These aspects are, currently accepted as the standard for assessment for most scientific institutions in the world (Palmquist, 1996; NIHL, 2010).

There is also a trend, in which Research Performance Measurements (RPM) are becoming central to the judgment of academic work. As objective standards of statistical representation, they are globally measurable and comparable. Thus, it is comprehensible to see them as the main method of justifying the allocation of research funding and infrastructure investments. The growing importance of university rankings is evidence and a driver of such a tendency (Dempsey, 2010).

However, as research on the topic is still highly non-uniform, the impacts of such performance measurements on research are still being disputed. The methods used to assess collaborative activities are still exploratory (Send, Friesike, & Zuch, 2014). One of the most significant weaknesses identified relates to the limitations of using network analysis to describe and to understand the direct interactions of individual actors. In other words, the list of co-authors in a paper is not an accurate indicator of the extent and quality of the contribution by each author. The “accumulated history of activity” (p. 328) represented by the analysis of a network, can simply be the result of a “career gaming process”, which inhibits collaborative discovery and innovation (Trier & Molka-danielsen, 2013).

Recent research confirms the consequences of the dominance of ISI[1]-style standards, especially concerning cultural capital (such as one's language

[1] Institute of Scientific Information (now the Web of Science-Thomson Reuters)

proficiency), institutional structure and the historical development of professions. Peripheral scientific production, for instance, has a competitive-collaborative relationship with other publishing and performance-assessment methods, and holds a special atavistic dependence on the international mainstream (e.g.: Thomson Reuters, Elsevier, Google). Furthermore, as all systems come to influence national and local institutions, it is appropriate to bear in mind in this analysis three influential and intertwined factors:

- Hierarchies of the World Scientific System (with the trend towards internationalization)
- Structural constraints;
- The history of professionalization.

The inequality of resources is an obvious reason against international standardization of performance assessment. However, the circulation of ideas deserves further attention, since some negative impacts in the periphery of international publishing are already known. Nevertheless, the yet unexplored impacts on quality of content are definitely a bigger concern (Beigel, 2014).

The issue of competition

A recent study by a team of researchers of the Alexander von Humboldt Institut für Internet und Gesellschaft (HIIG) examined peer-reviewed literature on motivational models for online co-creation. The results linked the increase of competition to the reduction of motivation for collaborative creation. Furthermore, it shows evidences that factors like “rivalry”, “incentives” and “uncertainty of a problem” influence the quality of contribution. This complex equation makes it clear that competition negatively influences internal processes of co-creation, yet also function as a mechanism to stimulate the pursue of good results in relation to external (international) exchanges. The idea of quality here, is associated with the concept of group cohesion (Send, Friesike, & Zuch, 2014).

So why is scientometrics prevailing in academic assessment? The answer points to an ideological discussion, entwined with political and economic arguments.

The quantitative evaluation of research is of special interest to big publishers and major scientific content databases, like Thomson Reuters[1] and Elsevier, which is

[1]http://thomsonreuters.com/products_services/science/science_products/scholarly_research_analysis/research_evaluation/

expressed in their increasing interest in university ranking[1] . Lorcan Dempsey, chief-strategist of the Online Computer Library Center[2] (OCLC), believes that it is simple a business matter, which does not grasp the whole range of communication in academic contexts:

> "Of course, this interest in research analytics and metrics is not without opposition. However, it is interesting to see Elsevier and Thomson Reuters very clearly identify this emphasis within their product offerings, and the location of Bibliometrics within the broader area of research analytics and metrics services to university customers." (Dempsey 15/05/2010).

Game theory practitioners provide another methodological option. There are several works that apply gaming experiments to evaluate collaborative behavior. However, the game theory method is not appropriate to deal with situations where individuals, inspired by political or ideological elements, do not seek "equilibrium strategies" (Thomson and Perry 2006, p.:30).

Furthermore, these measurement indexes do not consider many factors involved in writing and publishing, such as bureaucratic requirements, institutional contexts and individual motivations or interests, not to mention the impact of research to society. The "network metrics" (Yao, 2009) are also inaccurate to describe and understand core structures, processes and problems of scientific authoring and publishing (Liang & Zhong, 2013).

It is also important to note that, metrics are inevitably embedded with ideology and imposed values, legitimizing political decisions according to the automatic selection and analysis of certain statistics. The ideology in this case is represented by customer relationship management (CRM), a well established business offered by big private companies to most educational institutions in the world (Dempsey, 05/09/2010).

The goal is, as usual, to improve productivity and economic sustainability of educational work. Indexes and rankings are a representation of the scientific ideal, and a pursuit for validation by the corporate world, when in fact, they represent ideological bias within themselves (Silveira, 2014).

This issue raises a critical view of the concept of labor productivity in research. The critic stands for technical details (such as the sequence and position of co-authors in

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[1] http://www.timeshighereducation.co.uk/story.asp?sectioncode=26&storycode=408908&navcode=105

[2] http://www.oclc.org/

a paper), and lacks truly qualitative parameters, but it also advocates for complex ideological ideas, such the current industrial logic of research production.

According to Abramo, D'Angelo, & Rosati, (2013), the distortions produced are related to the indicators from bibliometric ranking lists and the characteristics and structure of research-projects. These problems also stem from trying to represent abstract concepts, like creativity and innovation, through proxy quantitative parameters such the number of papers published, or patents registered.

For contextualization, it is fundamental to accept the "intangible nature" of the scientific work (Popper, 2006), and the fact that science is never an individual enterprise. Therefore, the current system of research assessment is always a matter of "limits and approximations" (Abramo, D'Angelo, & Rosati, 2013 - p. 198).

The issue of quantity

Among the limitations of the argument in the present research, there is the complicated task of defining and valuing the individual contribution of many collaborators involved in a work output. In that regard, Bibliometrics can serve as a convenient tool for the large-scale assessment of productivity. It generally corresponds very well to administrative goals, but it can-not grasp the very collaborative nature of the research work itself. The problem is summarized as follow:

> **"**Even famous and widely used bibliometric performance indicators, such as the h-index (Hirsch, 2005) and the g-index (Egghe, 2006), totally ignore any consideration of the contributions of the individual authors to the scientific product."(Abramo, D'Angelo, & Rosati, 2013 - p. 199)

Normally, mathematical assessments tend to divide the credit for writing a paper equally among authors, rather than giving each author credit for their specific contribution. In other words, current quantitative solutions may sacrifice the merit of true authors in the name of homogeneous and objective indexes. A suggested adaptation, such as having co-authors symbolize the importance of their contribution, may help to reduce biases. However, nothing would impair a more transparent solution, such as the editing tools of wikis, or of Google Docs, where it is possible to see each individual contribution (Baldwin & Austin, 1995 / Said, Wegman, Sharabati, & Rigsby, 2007 / Anderson, 2008 / Young, Ioannidis, & Al-Ubaydli, 2008 / Rubí-Barceló, 2008 / Castelvecchi, 2010 / Metze, 2010).

What is more, why are these ideas for improvements of tools not being addressed? Suspicion points to the values of the current academic context and culture. In other words, as long as individual interests prevail, the current scientific tradition of transparency is to have little transparency, especially regarding writing and publishing activities (Hilgartner, 2002 / Gonçalves, 2006 / Ware & Monkman, 2008 / Berners-Lee, 2010 / Kohlenberg & Musharbash, 2013).

When assessing intellectual contributions, it is also interesting to consider how irrelevant topics or information that are produced to meet bureaucratic requirements fit. What should the assessment criteria be? A topic's relevance? Its content quality? How it has been reviewed? Its level of insight? How should the utility of research work be evaluated and judged? It is important to consider that collaborative work does not follow an arbitrary formula (Raymond, 2001 / Maniates, 2003 / Oldman, Doerr, & Gradmann, 2014).

There are well developed models of graphic and statistical representations that consider the number of scientists who formally share the authorship of a research paper and all possible relations among the authors. However, such parameters do not explore the norms, tools and behavior of authors when writing a text together with other fellows. Within the same logic of analysis, citing and referring to content produced by other colleagues are, probably, among the most common and known activities in the scientific publishing system (Newman, 2000).

Therefore, the relevance or importance of an article is assessed by other researchers who "use" and "cite" it; citations are the "metric of impact" used to measure scientific progress and productivity. Moreover, institutional careers and research funding is directly dependent on these citations and reference records (Harnad et al. 2004).

In the present research, the number of citations and references that a paper receives is considered a matter of "information usage", instead of instances of "author collaboration" (Jankowska, 2004 / Olson, Bos, & Zimmerman, 2008 / Bhat, 2009). Furthermore, scrutiny here also goes beyond the number of documents extracted from big databases, like the Web of Science, with its indexes, ratings of the most active co-authors, publications and the most used terms (Yao, 2009). The goal of this research is to unveil the reasons behind practices in scientific publishing, and even

deeper to the (academic) culture that shapes them. Through this, there is an intention to point to norms and policies that might help to improve the communication quality between academics.

The issue of quality

Academic authorship is collaborative by principle - while the authorship of a text may be attributed to a single person, the ideas and knowledge that the text carries are always the result of a cumulative process of discovery and communication. Furthermore, as long as the attribution of authorship remains an unresolved issue, collaborative writing might have to wait to be adopted as a formal practice in scholarly environments. In an analysis of writing practices of Bobcatsss participants, Tor Sveum (2013) identifies three main forms of collaboration in writing:

- Independent form = each author works alone on specific parts of a document, and at the end all parts are put together
- Collaborative writing form = all authors work on the whole text
- Individual form = a single person writes the text and others perform different tasks (such as: reviewing, editing, checking data, copydesk). (p. 218)

These forms of collaboration divide and attribute authorship in four ways:

- Alphabetical order
- Contribution size order
- Creator order (who had the idea);
- Mentor order (teachers first). (p.218)

Sveum (2013) also lists the advantages of individual writing, in contrast to collaborative co-creation. But these points below, however, do not grasp the qualitative aspects of content production, and could be summarized as matters of personal convenience.

- It fosters independence, without great need for compromise;
- The resulting work is more concise and homogeneous;
- Tasks are performed in a faster fashion, with no need for review or approval;
- Greater focus on theme and content construction, as a result of less conflicts from diverging perspectives and opinions
- Greater control over spatial and timing issues. (p: 219)

The concept and form of quality are also still hard to define. In research quality depends on the context and interests of the actors involved (Czellar & Lanarès, 2013).

As meaning is not quantifiable, the significance of credit content is still better performed through direct human interactions. In other words, it is not convincing to see data as a self-evident entity, as something that is not subject to interpretation. This is due to, among other factors, the fact that our models for data still do not accurately define the complexity inculcated in the concept of context. In practice, it would require a level of transparency and openness that no institution in the world has yet achieved (Oldman, Doerr, & Gradmann, 2014)

Thus, the idea that the number of citations a paper has in other works, or the number of co-authors involved in writing are signs of quality, are hardly proven, and particularly if formal constraints, such as the strict limit of pages for publishing papers, is considered. They (arguments or criteria) are either an arbitrary or extrapolation measurement. In most cases, they are created to attend or to conform publishing and editorial rules and standards. Therefore, the dramatic increase in collaborative writing in science is a matter of technological shift and institutional settings, rather than the effect of cultural change (Sveum, 2013).

A core problem for co-authorship is that current academic practices, especially regarding management and assessment, hinder the promises of recent technological breakthroughs. Cyberinfrastructure does not, “per se”, define how well methods and features are applied, and a lack of meaning and context are caused by a lack of engagement from the interested communities. Above all, scholars who produce information should be more supportive of a transition from closed to opened infrastructures, frameworks and ideology. This is one of the conclusions of the most recent studies on Semantic Web:

> "...we are currently unable to implement a meaningful representation of scholarly work on the Semantic Web and within Linked Data. While we understand that Semantic technologies may provide answers to these issues, the skills and knowledge necessary to move from activity definition to knowledge representation, and again, make the implicit, explicit, are still in their early stages..." (Oldman, Doerr, & Gradmann, 2014 -p. 19)

In the present academic context, there is a lack of meaningful discussion about the current incentive system, and the kind of co-authorship it promotes. In light of the the huge and continuing expansion in the number of publications and articles, finding indicators of quality and rigor are a crucial and urgent issue. New ways and vehicles for the distribution of information are one of the possible solutions. Innovative review processes promoting distinct new forms of work, may be another way out for the

current qualitative bottle necks in scientific production. Nevertheless, the lack of incentives for qualitative collaboration is an institutional aspect that is still very superficially approached by the Library and Information Science literature (Abramo, D'Angelo & Rosati, 2013).

Practices of “keeping score” in many countries, including Brazil, demonstrate the side effects of this enhanced technology applied to traditional structures. However, instead of solving old problems, this exacerbates them, which compromises other goals of the scientific publishing system. It is unavoidable for scientists to get into “career gaming”, especially if publishing is still the main, and nearly only way to certify academic achievement (Davis, 2014 – p. 199).

4. The Brazilian Context

Brazil is the biggest country from Latin-America. This can be said about the size of its territory (8,515,767 km2), its population (200 million), its economy ($ 2.5 trillion GDP) and its science. By 2013, from the 316 Latin American journals indexed by the Web of Science database, almost half (153) were from Brazil (Beigel, 2014). On the other hand, it is still a country marked by medieval structures of its society. And this is reflected in the very high social inequality (85th. position in the HDI 2012[1]), and a weak performance in innovation (69th position globally and 8th position in Latin-America on the GII 2013[2]).

The Mongrel Complex

The image of backwardness inculcated in the word “medieval” was expressed by Decio Pignatari in 1968 (Informacão. Linguagem. Comunicacão – Edit. Perspectiva), and it is still a fair picture, specially in what it concerns cultural and social contexts. He blamed the historical mediocrity of country's elite, which was still seeking imported solutions for the internal problems. What today is also commonly referred as “The Mongrel Complex”[3].

For Pignatari (1968) too, this national low self esteem represents a major obstacle to the pursue and appreciation of original information and knowledge. Furthermore, the imported material has from the beginning two problems: it is usually poorly sorted and often mistranslated (p.88).

Weirdly enough, another problem pointed was the structural localism, what sometimes turns to provincialism of the universities' agenda. What manifests in an endogenous culture of self promotion and recognition (corporatism). To Pignatari (1968) the education system must follow the historical and social needs of a country-community in order to accomplish its mission.

The main argument in what it concerns the present work relates to a historic dependency of the country towards imported tools, structures and policies applied to education in all levels. Recent studies on information science confirm the alignment

1 http://hdr.undp.org/en/statistics/hdi
2 http://www.globalinnovationindex.org/content.aspx?page=gii-full-report-2013#pdfopener
3 http://pt.wikipedia.org/wiki/Complexo_de_vira-lata#cite_note-Mariotti-2

of the Brazilian Government with the logic of Big Business, adopting continuously mechanisms that foster the “monetization” of knowledge production. The idea in the background is to make the national market similar to that of developed countries, a sign of the so called “informational capitalism”, and at the same time a symptom of the Mongrel Complex (Silveira, 2014 - p. 579 & 582).

4.1 Quantity x Quality

There is abundant evidence that Brazil has followed the international trend of expanding greatly the quantity of scientific publishing. According to Dr. Mauricio Rocha e Silva (2011), editor of Clinics Magazine, monthly scientific publication of the "Medicine Faculty of the University of São Paulo", one of the biggest medical institutions in Brazil, during the first semester of 2011 it was registered an increase of 127% in the number of papers submitted to the peer-reviewed publication, in comparison with the same period of the previous year.

This trend follows a similar one verified in general scientific publishing in Brazil. "During 1996 Brazil was the 21st. country in terms of scholar publications, summing up 40 thousand articles (around 2% of the world production). In 2010 the number exceeded 43 thousand scientific texts published", says Dr. Rocha.

He adds that at least a part of this increase is due to the advent of online publications for scientific means. Until 2009 the Clinics Magazine was a press publication, with a limited number of copies, and therefore the number of readers. Since then it increased drastically its public range, being today the 13rd most red journal on the field of medical research. It is important to mention that "Clinics" is currently published in English language, and it has an open access policy towards the distribution of its content (Rocha e Silva, 2011).

According to Penteado Filho & Dias Avila (2009) it is innocence to attribute the increase of production from Brazilian researchers to the advent of online publications. They point as well to an increase of the number of Brazilian periodicals indexed by important databases like Web of Science (WoS). Since the beginning of the present century this has been a main factor boosting the bibliometric performance on important scientific areas such as Forestry in Brazil. Their study

analyzed the performance of Embrapa's (public research company) centers in the periodicals indexed in the WoS database from 1977 to 2006.

According to official data[1], at ISI/Web of Science database (USA), until 2009 (last year available), Brazil is in the 13th. position (2,69%) of the ranking. It is the most important country from Latin America in terms of production (54,42%).

Gomes de Souza & Azevedo Ferreira (2012) published a paper with a bibliometric analysis of researchers' collaboration on the information science field in Brazil during the period 2000-2010. The investigation confirmed that research activities in Brazil coincide with the establishment of the graduate system of education in the 70's. Therefore, Brazilian research is done until nowadays in universities (specially public) and research institutes (mostly public funded as well), and in practice by graduate students collaborating with their professors.

The target group of the study were academics with the Research Productivity Grant funded by CNPq - National Council for Scientific and Technological Development, federal institution under the Ministry of Science, Technology and Innovation (MCTI). This funding is awarded considering productivity indicators (Lattes Database), which also serve as a standard parameter of prestige and status among academics, courses and their respective institutions.

Following the productivity grant, the investigation focused on 44 researchers, taking part in 77 groups with 131 research lines in the area of information science, which is considered an "applied social science" area. These researchers were from 13 graduate programs (19 courses = six doctorates + 13 masters) offered in whole country on this field. In general, the investigation confirmed an asymmetry of the educational system following the economic differences among the five regions of the country and their respective participation on the GDP.

The researchers investigated published 733 papers in 10 years. 627 in Portuguese, 69 in Spanish, 27 in English, and 10 in French. This relates to the language proficiency of the Brazilian academics, which is also influenced by the local and national scope of most of the works found.

[1] http://www.mcti.gov.br/index.php/content/view/5710/Numero_de_artigos_brasileiros_da_America_Latina_e_do_mundo_publicados_em_periodicos_cientificos_indexados_pela_ThomsonISI_e_Scopus.html

Co-authorship indicators were the main parameter to analyze collaborative activities (partnership and interaction). They confirmed an international trend towards increasing number of papers and co-authors verified in many areas of knowledge.

For the Brazilian academic establishment the adoption of quantitative indicators for the assessment of research work is an advancement. They are already fundamental to the institutional decision and policy making process. However, the debate about its impacts, specially upon the distinct forms of publishing culture, is still crawling. The necessity of indicators considering the specificities of knowledge area, national region and country are the most mentioned. But there are those regarding the idea of quality itself, which is still an underdeveloped discussion (Marchelli, 2005).

More recently problems with self-citation at mainstream databases, raised again the question about the appropriateness and fairness of the almost exclusive use of indexes of publications by the national agency of graduate education as a mean to assess academic performance (Van Nordeen, 2013).

The issue has been addressed for years by the scientists themselves. Many demonstrating the harmfulness of policies such as the adopted by agencies of the Brazilian Ministry of Education (CAPES and CNPq) in what it concerns the evaluation of academic performance. Weirdly enough there is still yet no sensible answer from governmental institutions in that regard (Metze, 2010).

4.2 Legal scope

Undergraduate and graduate education in Brazil are primarily regulated by federal legislation, which defines the autonomous form of management applied to every institution. Currently, public universities respond to 82% of the master courses and 90% of the doctor courses offered in the country (PNPG 2005 - 2010).

In a chronological order, the most important legislation referring to production of scientific content / knowledge in the graduate education are:

– to form competent teachers who can meet the quantitative expansion of our higher education by ensuring at the same time, rising on the current levels of quality;

Expert paper nr. 977/65 (C.E.Su) – defining graduate education

The Expert advice paper 977/65 of the Superior Education Council (C.E.Su), body of the Ministry of Education, from 03/12/1965, is a document prepared by a committee of experts and intellectuals aiming to define and regulate the graduate education in Brazil. The document refers to the "vagueness about the nature of these courses" in that historical period. More then that, the document says: "Regarding the Brazilian university, the postgraduate courses, in regular operation, hardly exist." Or as stated at its conclusion: "The truth is that in terms of graduate education we are still creating a tradition" (pg. 09). It is valid to consider that the text was prepared one year after a military coup overthrew the elected president of the country.

Based on the North-American graduate system, the text considered graduate courses as the ground for the training of researchers and teachers, and suggests the official adoption of Master and Doctor degrees, as two successive cycles of the so called "superior education", referring to higher education. At the same time the Council has set the minimum requirements for courses' implementation and the granting of diplomas. The John Hopkins University, created in 1876, is taken here as a model institution in that regard. The text states: "This is an university not only for the transmission of knowledge already built, but also for the production of new knowledge through creative research activity." (pg.04)

More curious, for the present investigation, is the influence of the German education system over the North-American system, attributing to this relation the full development of activities like the technological and scientific research, and concepts like "creative scholarship". According to the document the Graduate School is equivalent to the Faculty of Philosophy of the German University. A characteristic influence of this is, for example, Ph.D., Doctor of Philosophy. It is a tittle conferred on any field of science, but it is so named because the original School of Arts became, in Germany, the Faculty of Philosophy.

The main reason for this regulation is the need for a development of a native educational system capable of responding to the growing demand of industry and economy. The authors refer to "the urgency" to promote the implementation of systematic post-graduate courses in order to train scientists and technologists, especially considering the expansion of the Brazilian industry. According to the

ministry's paper, there are three fundamental reasons that require the immediate establishment of a system of postgraduate courses:

- stimulate the development of scientific research through the proper preparation of researchers;
- ensure the effective training of technical and intellectual workers of the highest standard to meet the needs of the national development in all sectors.

In summary, the graduate education (stricto sensu) has to have, according to the paper, the following characteristics:

- is academic in nature and has mainly scientific goals;
- confer academic degrees;
- forms essentially and systematically the staff of the courses that make up university's campuses.

Resolution nr.05/83 (CFE) – standards for post-graduate studies

The Resolution Nr. 05 of the Federal Council of Education (CFE) from 10/03/83, establishes standards for accreditation and operation of post-graduate studies. The 7th. Art. requires from teachers of postgraduate courses the exercise of creative activity, demonstrated by the production of original works of proven value in their area.

Federal Law nr. 9.394/96 – updating guidelines for graduate education

The Law Nr. 9.394/96, of the National Parliament and President of the Republic, from 20/12/1996, establishes and updates the guidelines and bases of education in Brazil. It determines that education shall be based on the principles of freedom to learn, teach, research and promotion of art and knowledge. Education, though, should promote the pluralism of ideas and conceptions of teaching, at the same time ensuring appropriate quality standards (Congresso Nacional do Brasil, 1996 – 3rd. Art.).

Political structure

Regarding the administrative and political structure of superior education, the Federal Law 9.394/96 determines that governments at national, state and municipal levels shall organize and coordinate their educational systems in order to create a collaborative effort to attend its goals (8th. Art.)

To this extent, the national government will be responsible for:

- collect, analyze and disseminate information concerning education (V);
- to ensure a national process to evaluate the academic performance in primary, secondary and higher education, in collaboration with education systems, aiming to set up priorities and to improve the quality of education (VI);
- to fix general rules of undergraduate and graduate courses (VII);
- to ensure a national process of institutional evaluation of higher education (VIII);
- authorize, recognize, accredit, monitor and evaluate, respectively, the courses of higher education institutions and establishments of its educational system (IX). (9th. Art.)

The Federal Law also says that educational establishments, subject to the common standards of its education system, have the task of articulating, with the families and the community, processes of integration between society and school (12th. Art – VI).

According to this Law, the federal system of education includes:

I - the educational institutions maintained by the federal government;
II - institutions of higher education created and maintained by private initiative;
III - the federal agencies of education. (16th. Art.)

Graduate education

The Law Nr. 9.394/96 is the most important legislation for the graduate education system in Brazil. According to it, higher education aims to promote the spread of cultural, scientific and technical knowledge, which is considered patrimony of humanity, and to disseminate its advancements through teaching, publications or other forms of communication (IV); to stimulate the awareness of the problems of the world, particularly the national and regional ones, providing specialized services, and establishing a reciprocal relationship with the community (VI); and to promote projects outside of the campus, open to public participation, in order to disseminate the achievements and benefits from cultural creation and scientific and technological advancement (VII).(43rd. Art.)

Most important, this basic law defines universities as institutions of multi-disciplinary training for higher education professionals, researchers, experts, and for the cultivation of human knowledge, which are characterized by:

> I - institutionalized intellectual production through the systematic study of relevant themes and issues, from a scientific / cultural, and regional / national perspective;
> II - at least a third of the faculty with academic title of master or doctorate;
> III - a third of faculty dedicated in full-time (52nd. Art.)

Administrative ideals

The Article 70th. prescribes statistical surveys, studies and researches (quantitative methods) as the main assessment forms of educational institutions at all levels (V). The costs and expenses for the implementation of such mechanisms are to be considered part of academic maintenance and development investments. In other words, they are treated as fundamental for the achievement of basic scholarly goals, including quality improvement and expansion of education.

The Article 86th. determines that institutions of higher education incorporated as universities will be integrated, also as research institutions, to the National System of Science and Technology, under specific legislation.

Resolution nr.02/98 (C.E.Su) – Intellectual production

The Resolution Nr. 02 of the Superior Education Council (C.E.Su - body of the National Council of Education) from 07/04/1998, establishes indicators to demonstrate institutionalized intellectual production for purposes of accreditation, in accordance with the Section 46 of Article 52, item I of the law 9394/96.

The Article 1st. defines that the intellectual production of each institution is made up by systematic scientific, technological or humanistic research, from a number of teachers, mostly doctors, over a given period of time, and published mainly in vehicles recognized by the community of the area.

The indicators to assess the intellectual production of professionals from accredited institutions were established in the Article 2nd. as follows:

> I - participation in conferences, exhibitions, or scientific meetings (national or international), and especially in national congresses of the respective area, in order to present papers recorded in their annals;
> II - publication of research results in books or peer-reviewed journals, or publications that have external editorial board composed by recognized experts in the area;
> III - development of systematic institutional exchange through the participation of their faculty in graduate courses, exchange of visiting professors or involvement in inter-institutional research; (b, § 1st.)

Furthermore, in the evaluation of section II will be considered the number of publications and papers presented at the Congresses. This number shall, in the last three years, be equivalent to at least 9% of the number of teachers. (§ 2nd.)

Act Nr. 3860/01 – evaluating graduate education

The Act Nr. 3860 of the National Parliament and President of the Republic, from 09/07/2001, provides further criteria for the organization of higher education, evaluation of courses and institutions, including those of graduate education. It consolidates the choice for international standards of academic assessment, exclusively applying quantitative methods on the evaluation of graduate and under-graduate courses in universities all over the country.

It establishes that the evaluation of courses and institutions of graduate and undergraduate education will be organized and implemented by Instituto Nacional de Estudos e Pesquisas[1] (INEP), comprehending the following actions:

> I – assessment of the main indicators of general performance of the national system of superior education, according to each discipline on regions, and states.
> II – evaluation of each institution's performance, considering at least the following criteria:
> d) capacity of access to communication networks and information systems;
> h) scientific, technological and cultural production;
> III - review of higher education, by analysing the results of the National Course Examination and bid conditions of courses of higher education.(Art. 17th. - pg.05)

Furthermore, the analysis of the conditions of offered higher education courses, referred in subsection III, will be performed, in its local operation, by duly appointed committee of experts. This analysis will consider libraries, with particular attention to the specialized collections, including electronic, to the conditions of access to communication networks and information systems, their operation and modernization of the services to the public. (§ 1st. - IV)

Most importantly, the assessment of masters and doctorate courses, according to each field of knowledge, will be conducted by CAPES, applying specific criteria and methodologies. (Art. 18 - pg.06)

[1] http://www.inep.gov.br

About sanctions

Identified deficiencies or irregularities by supervisory actions or evaluation and re-evaluation of courses or institutions of higher education, in accordance with 46th. Art. of the Law 9394, from 1996, or the failure to comply with the terms of commitment mentioned in the 25th. Art. of this Decree, the Ministry of Education shall determine, as appropriate:

> I - the suspension of recognition of higher education courses;
> II - deactivation of higher education courses; (Art. 35. - p. 09)

Resolution 32/04 (CEPE – UFPR) – Publications' support at the UFPR

The Resolution 32/04 of the Board of Education, Research and Extension at the Federal University of Paraná (CEPE-UFPR) from 2004 establishes the statute of the institutional Programme to support Scientific Publications at the UFPR. The CEPE (Conselho de Ensino, Pesquisa e Extensão) is a legislative, consultative and deliberative body of the university's management.

The institutional program to support the publication of scientific journals is the mechanism that promotes and manages UFPR's institutional policy towards journals edited by its departments, institutes, centres and foundations. A journal, or scientific publication will be considered institutionally linked to UFPR when duly registered at the Dean of Research and Graduate Studies (PRPPG), by the heads of department, or by the coordination of undergraduate and/or graduate courses. (Art. 1st. - § 1st.)

The general objectives of the program are:

> I - financial support of journals institutionally linked to the UFPR;
> II - technical support of journals institutionally linked to the UFPR;
> III - ensure the quality of journals institutionally linked to the UFPR;
> IV - promote and ensure the circulation of publications institutionally linked to the UFPR, either through swaps, sales or donations; and
> V - unify dispersed efforts that allow optimization of resources devoted to the publication of periodicals institutionally linked to the UFPR. (Interdisciplinarity need)

The specific objectives of the program are:

> I - the commitments listed in Art. 2nd. have as major goal to regulate the frequency of publication of institutional journals, thus allowing the request for financial support through the programs of agencies of academic development;

> III - the program should also encourage publishers to raise external funds to support the publication of journals, in order to complement the necessary financial resources to maintain the periodicity of institutional journals.

The organizational structure of the program to support academic publications has a highly bureaucratic and centralized character, being divided in bodies with overlapping attributes and responsibilities (e.g. Assembly, Council/Board, Coordination). There is also no reference about online publishing, as there is no mention about any support to authors. All efforts and initiatives are directed to institutional interests, and therefore are dependent from institutional structures.

Among the responsibilities of SIBI (Library System, it is a member of the Assembly, and of the Council of the program) there is the attribute to foster the interchange / trade of UFPR's institutional publications with publications of other institutions (Art. 17th. - IV).

Resolution 65/09 (CEPE – UFPR) – Rules and norms for graduate programs

The Resolution 65/09 of the Board of Education, Research and Extension at the Federal University of Paraná (CEPE-UFPR) from 2009 establishes the current rules and norms for graduate programs (stricto sensu = Master and Doctor levels) at the UFPR. The resolution was based on a advice paper (236/09) authored by Prof. Dra. Graciela Inês Bolzon de Muñiz, one of the interviewees of the present investigation.

In the Article 2nd. it states that the academic master and doctor courses aim to deepen concepts, knowledge of methods and techniques of technological, artistic, and scientific research, and the training of human resources for the exercise of teaching and research activities. (§ 2nd)

Section V - About professors' accreditation

The accreditation and re-accreditation of professors of graduate programs must be approved by the respective boards, according to criteria of minimum productivity and participation established in the internal rules of each program, considering the requirements of CAPES (Art. 30th.). This reaffirms the exclusively quantitative character attributed to the academic's work assessment implemented in all public universities of the country.

Section XI - About project, dissertation and thesis

In the dissertation (Master level), for instance, the candidate must demonstrate mastery of the chosen topic, methodological rigour and ability to research, to systematize and to express knowledge properly (Art. 60th.). On the other hand, the thesis (Doctor level) aims to knowledge production, and should provide original and significant contribution to the study area in which it is developed (Art. 61st.). Theses and dissertations should be submitted according to the Guidelines for Presentation of Scientific Papers published by UFPR's central publishing house (based on the Brazilian Association of Technical Standards (ABNT) document) or other document approved by the Board of the course (Art. 65th.). There is no mention regarding creative work, and most important, no reference to critical thinking, as the entire process of dissertation is treated as an industrial process, based on competitive standards.

As a proof of such ideology behind rules and norms followed by graduate programs, in the Article 66th. of the resolution it is established that the public session of dissertation's or thesis's defence will consist of the presentation of the work by the candidate, followed by oral examination, ensuring enough time for the presentation and responses of the candidate. However, the defence may be held in closed session, relying only on the presence of examiners and of the candidate. This option will be authorized by the Board of the Program, depending on a proven need for secrecy on intellectual property, by filing or submission of patent register linked to the dissertation or thesis (§ 3rd.). This can be considered an absolute discrepancy, since the program is established in a public university, with its main structures funded by the money of taxpayers.

Chapter IV - About academic titles, diplomas and certificates

To obtain a master's degree, the student must prove to have submitted at least one article for publication in scientific-technical journal with editorial staff, with the approval of their advisor, or other production indicated by the Board on its activities in the Program (Art. 79th. - III). To obtain the doctoral degree, the student must prove the acceptance of at least one article submitted for publication in scientific-technical journal with editorial staff, with the approval of their advisor, or other production indicated by the Board on its activities in the Program (Art. 80th. - III).

4.3 Principles of graduate education in Brazil

The National Plan of Post-graduation (PNPG) is the main political instrument dictating the guidelines and principles of graduate programs in Brazil. Based on it the Capes/ME establishes the National System of Post-graduation. The PNPG was first published in 1975, with a time spam for the implementation of its directives of five years (1975-1979). It was based on the Expert advice paper 977/65 of the Superior Education Council (C.E.Su), and its main objectives were:

- raise the current standards of performance and rationalize the use of resources;
- prepare the educational institutions to expand towards a more balanced structure between areas and regions.
- institutionalize the system, consolidating post-graduation as a regular activity within universities and therefore ensuring them stable funding;

According to this first document, graduate courses (stricto sensu) offered by public universities should have the following characteristics:

- have essentially scientific objectives;
- confer academic degree.
  (pg.19)

The second round of PNPG (1982 – 1985) focused more intensively on the improvement of the academic evaluation, while the third round of the National Plan (1986 – 1989) emphasizes the development of scientific and technological research, aiming "the conquest of national independence." The objectives of the 3rd. PNPG were:

- The consolidation and improvement of the performance of post-graduation courses;
- The institutionalization of research in universities to ensure the functioning of the graduate programs;
- The integration of the graduate programs with the productive sector.

On the same document it was stated the lack of a number of qualified scientists to carry out the task of boosting the country's technological and scientific independence. This ultimate goal should be achieve until the beginning of the coming new century.

The last version of the PNPG (2005-2010) praises the huge increase in quantitative records of graduate education in Brazil. According to the document, in 2003, from the

254,153 teachers who taught at graduate courses, only 54,487 (21.5%) had doctor degrees and 89.228 (35.1%) hold master degrees. The number of master titles granted increased by 757%, and of doctor titles in approximately 932% in the period 1987-2003.

Table 1 - Number of graduate courses in Brazil

Cathegory	Official number in 2003	Expectation to 2010
Doctor students (enrolled)	40.213	63.218
Doctor students (titles granted)	8.094	15.280
Master students (enrolled)	72.001	104.465
Master students (titles granted)	27.630	45.667
Professors with Doctor degree	32.354	49.020
Scholarships (CAPES and CNPq)	R$ 307 millions	-

Source: PNPG 2005-2010

There are enough data about the increasing number of graduate courses, professors, graduate students, scholarships etc, but there is no mention on the number of papers, articles, dissertations, thesis, information and much less in the quality of this very last. The only statistical reference mention the number of texts published by Brazilian researchers (12.596 in 2003) and/or cited in publications indexed in the ISI (Institute for Scientific Information) data-base. (pg. 15). What demonstrates the lack of an authentic native publishing system, considered even by Brazilian officials.

Until today there was no formal/official evaluation of the information management, or the conventional publishing model of Brazilian science's. During the discussion process of the current plan several topics emerged, among them:

- Evolution of the system;
- Large imbalances in the system;
- Pressure demand for graduate students;
- Structural factors that block the system performance;
- CAPES and its integration with other organs.

The diagnosis of the present situation points to the need to formulate specific strategies aimed at creating new paradigms for the evolution of the system. At this point the need to meet national priorities contradicts the necessity to reduce regional disparities (pg. 22). Since it is nearly impossible to implement a homogeneous policy

on a huge country like Brazil, with very significant cultural, social and economic differences among its regions.

The above said, can be taken as a fundamental critic of the two major national systems of academic assessment created by CAPES and CNPq:

> – the first oriented to evaluate the quality of graduate programs, as courses for training human resources;
> – the second aimed at assessing individual researchers and leaders research groups.
> (pg. 23)

It is to say that, those courses and individuals with tradition and well developed structures tend to keep their positions on the ranking, harming the chances of new institutions, persons and fields of research to ascend towards better positions, and therefore improving their chances of access funding and resources.

The PNPG refers to a need to improve the synergy among different actors of the system (researchers and institutions), but it does not mention anything about the improvement of the communication process among scholars. At the same time, the plan suggests the assignment of grades to activities that result from the scientific and technological production, but without changing or easing the concepts, criteria and parameters of the current system of evaluation (pg. 26, 27).

At the end, the PNPG formalizes a policy of copying and imitating the international parameters and strategies applied to evaluate graduate courses all over the world. Without adapting, or changing fundamentally any part of the current international system of scientific assessment, it merely bases its procedures on quantity of production (number of papers), barely considering important aspects of research such as relevance of topics to society or to the advancement of science. Thus, to the Brazilian research establishment:

- the visibility of academic production is proxy of impact index; and
- the contribution to new knowledge is proxy of citation index.

Yet in the document, the introduction of qualitative assessment of graduate programs is a desired achievement, but without any concrete suggestion on that regard.

The scenarios and forecasts made by the PNPG 2005-2010 also demonstrates the incapacity of national authorities to deliver authentic goals and parameters to be pursued. Accordingly, the total resources required for implementation of the plan is

US$ 3,26 billion, spread over six years. This represents twice as invested in the previous period. But despite the enormous effort in terms of training and resources, the mentioned investment would allow Brazil only to reach the number of doctors per 100.000 inhabitants, equivalent, for example, to the number reached by South Korea in 1985 (Pg.42 and 43).

4.4 Journals and publishing

The Revista Floresta (http://ojs.c3sl.ufpr.br/ojs2/index.php/floresta/) is a scientific publication edited by the Paraná State Foundation of Forestry Research, the CIFLOMA internal institution taking care of cooperation projects. The journal is the preferred vehicle of academics from CIFLOMA when submitting their papers. It is a quarterly publication, with 500 copies of about 200 pages per edition. The journal contains 20 papers, with an average of 12 pages each. Around 35% (7) of the published articles are authored by at least one academic from Cifloma/UFPR. All articles were submitted between January 2009 and June 2011, being published on the January/March 2012 Edition (Vol. 42 - Nr. 1), what characterizes a time out from 6 up to 36 months between submission and publication. The Revista Floresta is indexed by the following institutions, what makes it one of the 5 most important scientific publications on forestry in the country:

- AGRICOLA - National Agricultural Library (EUA)
- AGRIS - International Information System for the Agricultural Sciences and Technology (Italy)
- AGROBASE - Base de Dados da Agricultura Brasileira (Brazil)
- CAB - Abstracts (EUA)
- CIRS - International Centerfor Scientific Research (France)
- DOAJ - Directory of Open Access Journals (Sweden)
- EZB - Electronic Journals Library Max Planck Society (Germany)
- BDPA/Embrapa - Base de Dados da Pesquisa Agropecuária (Brazil)
- LATINDEX - Sistema Regional de Información en Línea para Revistas Científicas de América Latina, el Caribe, España y Portugal (México)
- PERIODICA - Índice de Revistas Latinoamericanas en Ciências (México)
- SCOPUS - Elsevier Bibliographic databases (Holanda)
- SUMÁRIOS.ORG Sumários de Revistas Brasileiras (Brazil)

The most important scientific publications on forestry in Brazil are:

- Árvore (Vicosa, UFV);

- Cerne (Lavras, UNICAR);
- Ciencia Florestal (Santa Maria, UFSM);
- Floresta (Curitiba, Fupef);
- Scientia Florestalis (Piracicaba, IPEF).

The Floresta is the less qualified among them (B2). The reason is the lack of certain international indexes required by the QUALIS classification system (CAPES). However, many professors asserted that the quality of the content do not differ, since the board of consultants and reviewers is almost the same on all these journals.

How an academic of Forestry proceeds when publishing an article

The Revista Floresta is available within the Digital Library of Journals of UFPR, a repository built on Open Journal Systems (OJS), a project developed and supported by the Public Knowledge Project (http://pkp.sfu.ca/ojs/). The managing editor of the journal, Lucia Burda, gave the following testimony:

> "The entire submission process of articles is done online, through the Open Journals System (OJS - Sistema Eletrônico de Revistas, port. Version). Usually the authors submit their texts attached in word document, but they can also submit a document in RTF or in OpenOffice. The file of the article should not be larger than 10 Mb. All instructions can be found directly on the journal website... The average time from the submission until the publication is 15 months. From submission to acceptance the average is six months. The authors must pay R$ 50,00 (+ - 20,00 Euros) per manuscript submitted. And the text submitted must be exclusive, and shall not have been published by any other vehicle before."

All operations, including the submission are done via attachment of the original file. All reviewers receive a copy of the document via E-mail and they give it back as an attached file per E-mail. The developers have already suggested implementing templates to allow the submission of texts directly on a web page, in order to have all review process online without the need of exchange of attached files via E-mail.

The main problem, according to her, is a lack of infrastructure. She is the only person to perform these tasks, and cannot stop the routine work to prepare the new templates. Furthermore, she mentions that, a change in procedures, would require the elaboration of tutorials and a teaching effort in order to show to the authors this new way of submitting a paper.

In many cases this would be an “inglorious task, since many scientists are still needing support even to use their E-mail accounts”. And the same is also true for most of reviewers:

“They are way too much used to work in a traditional way. It was already very hard for many when we stop accepting hard copies for the submissions and started to do it online with the attachment of files directly into our website."

5. Data, Results & Analysis

5.1 Procedures

Information Search Techniques

At the present work, I purposely decided to use Google Scholar as a source for scientific information. Beyond the many limitations, it is still one of the easiest tools to use for those who are simply seeking information in any realm of the scholarly life, whether the documents presented come from scientific journals or from commercial research laboratories. In order to find appropriated literature about the proposed topic, several forms of information search were applied. The main sources for the literature review were:

- Information retrieval in five scholarly databases (Library & Information Science Abstracts-LISA[1], OpenDoar[2], Web of Knowledge[3], Sage Journals Online[4], Google Scholar[5]);
- Indication of sources and materials via personal talks, conferences, meetings and e-mail;
- Reference lists from reviewed texts.

Few key words and sentences were used to guide the search for materials related to the investigated topic. The key words / expressions were:

- Characteristics of scientific knowledge creation (Google Scholar)co-authorship
- Co-authoring
- Collaborative scientific experiments
- Collaborative experiments within game theory
- Collective writing on scientific papers (Google Scholar)
- Google Docs / Drive
- Institutional norms for co-authorship
- Joint authorship
- Online co-authoring

[1] http://www.csa.com/htbin/dbrng.cgi?username=h...

[2] http://www.opendoar.org

[3] http://apps.isiknowledge.com

[4] http://online.sagepub.com

[5] http://scholar.google.com

- Scientific collaboration
- Scientific co-authorship
- Scientific publishing culture
- Shared writing
- Virtual communication at academic environments

In LISA there were no record found for "coauthorship in forestry", or "online coauthorship in forestry". And for "online coauthorship" almost all published works were related to Scientometrics, Webometrics or Bibliometrics. This is interesting to note, since online collaboration is a novel virtual form of an already existent and common phenomena at academic environments (scientific collaboration). LISA's data-base is registering this as a new phenomena, and very rare the texts found there resort on other existent notions and approaches regarding co-authorship.

Information Services

The biggest and most modern libraries at universities all over the world lack basic features of information search, retrieval and access. Simple things like listing best-matching results containing parts of the searched text, or in the absence of a printed publication, to provide access to a digital copy of the work. Whether it is legal or not, the fact is that other private or non governmental institutions are already offering such services to the general public (e.g. Google Scholar).

While searching information sources for this investigation, there were significant experiences within public and academic libraries. The books "Department & Discipline: Chicago Sociology at 100" (Andrew Abbot 1999), "The marketplace of ideas: Reform and resistance in the American university" (Louis Menand 2010), and "Wannabe U: Inside the corporate university" (Gaye Tuchman 2009), serve as examples of the problematic of scholarly information systems.

First they were searched in Internet. Any one can find the abstracts and few reviews on each title through a Google query. However, to access most parts of the content there will be only two options: go to a physical library or buy the hard copy of them.

On the other hand the option of physical library will require time and patience. In an initial try at the Grimm-Zentrum, the central library of the Humboldt University of Berlin, the results have been far from fair. First the catalog was unable to show

results with similar wording. It is to say that if for some reason the user misspell the name of the book, or its author, the retrieval search returns a "no matching results".

If that does not happen, and the user writes the name correctly of book or author, it is possible to see which libraries have the book. One of the required works (Abbott, 1999) was borrowed for another user until the end of next month. Another one (Tuchman, 2009) was under administrative processing, and could not be lent for the next two weeks. The last one (Menand, 2010) was not even found at any catalog available at the library system (20/04/2010).

Interviews

In October 2011, I started to contact systematically the coordination of the Graduate Program of Forest Engineering at the Federal University of Paraná, in Southern of Brazil. Advised by my second reader, Prof. Dr. Vitor A. Hoeflich, and member of the program's staff, I asked for an official intervention of the program's coordinators in order to facilitate the contact and schedule of interviews with all professors.

It is interesting to note that none of my four e-mails sent to the program's coordination (pgflorestas@ufpr.br) received any answer. Only after I called the coordinator directly (prof. Dr. Antônio Carlos Batista) on his mobile phone that I got a promise of support to my intention in contacting all professors in order to get appointments for face-to-face interviews.

After that, I immediately wrote an explanatory letter in Portuguese, with a short summary of my work, affiliations and a solicitation for an appointment to apply my questionnaire. I prepared inclusive a Doodle poll, intending to facilitate the organization and the time optimization of the schedule.

From the 53 names given to me by the coordination of the course, not a single one replied my E-mail, and only one professor did an entry of his preferred dates for the interview in the Doodle schedule prepared. At this point it became clear that, although the Internet brought an immense advancement for the possibilities of contact and communication with a group like professors from a graduate program, there are still several unanswered issues.

In other words, to get the contacts was not difficult, but to get a simple reply from them showed to be an impractical task.

After a couple of discussions with my second reader and the coordinator of the program, I decided to not insist in contacting the group. “Stress them by E-mail or telephone can cause even more resistance from the audience”, we conclude. The only remaining alternative was to go to Curitiba and chase after each professor in the campus, hoping they would agree to open a small window in their busy daily schedule for an interview with a student from a foreign university.

Later that decision proved to be correct. “If you would send these questions per E-mail to me, would probably never answer them... this is a real cultural barrier to the application of digital tools for academic communication”, told one of the first professors I interviewed.

On the site

I arrived in Curitiba on Monday, April 6th. And this first week was crucial in the process of comprehending the context I was about to enter and to schedule the first interviews.

While talking to the secretary of the program in the campus, I discovered that from the 53 professors listed on the Webpage of the course[1] three were outside the country, doing consultancy or researches for their post-docs. More impressive was that ten professors on the list (almost 20% of the total) were already disqualified for the program due to their unsatisfactory records of publications.

The justification of the secretary for such misinformation was the fact that the program was still being assessed by the Education Ministry (Coordenacão de Aperfeicoamento de Pessoal de Nível Superior do Ministério da Educacão - Capes/MEC), and that the reduction on the number of professors might represent a drop on the country’s graduate education’s ranking. In other words, the administration of the program do not update the webpage with a current list of professors in order to postpone the negative impact on its public image, due to the reduction on the number of professors, and was awaiting for an official evaluation due to the end of 2012, beginning of 2013.

Besides the issue of professors without the minimum number of publications required to a graduate program’s teacher, it is interesting to note that other five

[1] http://www.floresta.ufpr.br/pos-graduacao/contatos.html

professors were indeed “senior professors”. It means that they were already retired, but were still working at the program on a voluntary basis.

In total, I interviewed 46 professors, applying a survey (12 questions) in combination with six in-depth questions. From these, 37 were listed on the program’s website, including the five senior professors. Other 8 interviewed were working as substitute teachers, or are pursuing the indication to become an official member of the program.

Only three professors from the official list of the graduate program on Forest Engineering were not interviewed because they were located in another campus and all attempts to reach or found them were not successful.

One interviewee was a post-doc student from Cuba, and can serves as parameter, with the results analyzed separately.

Practical aspects and transcription

The 46 interviews took place from 09 April to 04 May 2012. The interviews lasted between 15 minutes, and two and a half hours, with an average of one hour. All interviews were given in Portuguese. All interviews were recorded and most of them took place in the building of the Center of Forestry and Wood Technology at the Federal University of Paraná State (CIFLOMA/UFPR). Only three interviews were given in different places, but even though in the work place of the interviewees.

The interviews were taped in order to allow for an open-minded exchange of thoughts. The recorder in case seemed to not have influenced their opinions about the problems at the institution they belong to. The order of the questions followed the script specified in section 3.4 (Questionnaire's structure), varying according to the interviewees disposition to deepen into certain issues or commentaries.

All interviews were transcribed into a Zotero library. Some of the problems (different but interrelated) faced by the interviewees while answering the questionnaire were:

- Many do not understand several questions (epistemology or/and ontology);
- Many have no clue about the topic, therefore have no formed opinion about it;
- Many do not perceive any advantage on dedicating more effort to communication activities;
- Some do not perceive value in such investigation, since it is not directly related to their work;

– Some are afraid in pronouncing their opinions freely, worrying to produce distress among colleagues and at their work environment.

5.2 Preparative inquiries

> The epistemological discipline that constitutes an essential part of the ethnographic method requires maintaining a scrupulous and systematic distinction between the knowledge and assumptions of particular informants (or categories of informants) and the knowledge and assumptions of the observer (s)." (Diana Forsythe, 1999 - p.: 133)

There were three interview tests in order to prepare the survey and in-depth questionnaire applied in the present investigation. They intended to verify the issues regarding the composition of the audience, the relevance of the scope, and the clarity of the questions.

The first test was conducted during the Long Night of Science (Lange Nacht der Wissenschaft) in August 2009. It was a survey with six questions applied to two graduate students and two professors at the Humboldt University of Berlin (Hauptgebaude).

The two students were PhD candidates of the Faculty of Agriculture and Horticulture of the HU-Berlin. One was from Brazil, with a research focused on the field of “Economic Sociology”, and the other was a foreign student from Honduras, working on the research field of “Horticultural Economics”.

Both professors were Germans. One was from the same institution, being the adviser of both students, but with an academic work focused on “Economics, Value Chains, and Marketing”. The other was a senior scientist (woman) at the Institute of Agricultural and Urban Ecological Projects, working on the research fields of ”Agro-food business” and “Food science”.

Regarding the usage of online tools, all declared to apply digital systems mainly for “consulting” and “searching” information, with “Google Scholar” as the preferred platforms for these purposes. Wikipedia was also named by one student and one professor. “Sharing” appeared as a secondary activity, while “referencing” and “publishing” as the last usage options.

“E-mail” was an unanimous option for the exchange of academic material. It was the only tool they declared to use everyday, with “intranet” appearing as a secondary tool

for “sharing” information. “Personal meetings”, “e-mail lists”, “intranet” (e.g. Moodle), “social networks” (e.g. Facebook) and “voice / messaging tools” (e.g. Skype) were the options for academic discussions.

Professors and students declared that “electronic journals”, “institutional websites” and “expert conferences” were the main forms for disseminating / publishing their academic work. Although “intranet” and “e-mail” were applied as well by the students. And oddly enough the students were still using a hard copy schedule for time management.

Regarding habits for writing, all declared to be familiar with new communication systems like weblogs, wikis, OPACs and online libraries, although none of them were applying collaborative writing platforms (e.g. Google Docs) for such purpose. “Lyx”[1] was mentioned by one professor as his preferred document processor.

At least one of the students had already experience with Open Access publishing, and was considering the possibility of applying for peer-reviewed electronic journals.

“Citavi” was the tool used by professors for references gathering and management.

Among the insights drawn from the application of this first questionnaire, it is worth mentioning the need of basic information about the research project (goals, methods, target group and disclaimer). This would give more credibility to the work, making it more suitable for an academic audience.

The options on frequency of usage of each tool or service should be measured according to concrete parameters (daily, weekly, monthly...). Also examples on uses, applications, services and tools would be fundamental for the respondents to verify their understanding over technical terms borrowed from expert fields like communication, information science and computer science.

The experience with Open Access publishing should have also practical examples in order to facilitate the interpretation and verification of its applicability on the context studied.

In certain cases, and contexts words like “facilitation”, “interaction”, “sharing”, “distribution” and even “organization” have similar meanings, or are correlated to each other.

[1] http://www.lyx.org/

The second research preparation was an interview with Prof. Dr. Vitor Afonso Hoeflich (UFPR), the second reader of the present investigation. It happened on February 22, 2011 in his office at the CIFLOMA/UFPR. This interview had no questionnaire, and was mainly exploratory. Its goal was to understand the context to be examined, and the current communication practices of the target group.

The information from the interview helped to shape the final structure of the quantitative and qualitative questionnaires, and gave many insights regarding the strategy of its application. The most relevant parts of the interview for the present research were:

> "The problem on this field (Forestry), is that the people don't want to be publicly stripped in certain aspects like communication..."
>
> "Publication is a growing institutional demand. But only as a general number (quatity of papers, articles, thesis, citations), where the quality of the content does not matter"...
>
> "The international publication of scientific journals work in the field of forestry like a Mafia. It is virtually impossible for a Brazilian researcher to get there."...
>
> "Shortly speaking, everybody is involved in a survival process, and on the other hand the society demand increasingly quantitative results, not because it is the best way to evaluate someone's work, but it is the easiest, maybe the only way to evaluate the academic production"...
>
> "If a person does not see an advantage for himself in any work or project, he tends to not collaborate with... At the same time, the level of institutional disengagement is already huge... Internally, the degree of flexibility has been reduced, and therefore students that are working in the daytime never get to meet their professors for consultation or support, since those are normally available only in the working time of the students. And they can not afford their studies without a job."

The third test was a trial with the final qualitative questionnaire applied to a 30 years old student on the 5th. year of Economics at an university also in the State of Paraná (University of Maringa). The questions and answers can be summarized as follows:

- Most tools applied for scholarly purposes are inherited from home (parents) or through the influence of colleagues. There is no offer or even any discussion about communication tools or the improvement of the academic communication.
- The only perceived value of the production of academic texts is that they are a mandatory requirement, therefore an administrative or bureaucratic task. It is not really something that involves communication goals.
- There is a lack of appropriate incentives for the improvement of scholarly communication in general, including publishing activities. And this has little to do with traditional journals and publications. Indeed, traditional vehicles work currently as barriers for the improvement of publishing habits and attitudes.

- Currently, collaborative work is perceived as a plain division of tasks, with no real interaction or exchange of thoughts, insights and ideas. Much less collaborative writing.
- There is no institutional offer or incentives for the improvement of collaborative activities such as co-authoring.
- The first goal of any educational institution is the instruction of the student, but primarily with certain means that allow the apprenticeship's assessment with numbers that can produce statistics.

5.3. Quantitative Data

Demographics

This chapter contains the description of the data collected by application of the survey of the investigation. It provides a general and an academic profile of the audience, serving as guide to the analysis of the context, with its differences and similarities among fellows, specially according to age, gender, background and field of work. The information was managed carefully in order to preserve the privacy and anonymity of the participants.

The survey was applied in face to face meetings to 46 academics working at the CIFLOMA / UFPR. A great majority of the interviewees were male (85%), and none of them were younger than 31 years old. At least 7 were senior professors, which means that they were already retired, and were working as volunteers at the university.

It represents an indubitable indication that the examined context is still predominantly marked by a traditional masculine character, what can be taken as a result of the late development of women emancipation's movement in Brazil. While the age and position of the interviewed professors indicate that they are part of a transitional generation in regard to the information and communication technology currently available. In few words, all of them became familiar with computers and digital communication in an advanced stage of their studies or work. Mostly after their graduate courses.

Table 2 - Gender of interviewees

Male	39	85%
Female	7	15%

Table 3 - Age of the interviewees

31 - 35 years	3	7%	46 - 55 years	14	30%
36 - 45 years	6	13%	56 - 65 years	17	37%
			66 years or older	6	13%

In regard to their activities, all interviewees divide their time and effort between teaching and research tasks. While 63% accumulate consultancy works, and more than a half (52%) also have some administrative position (e.g. laboratory coordination).

Besides the public university (UFPR), 26% also work for private companies, 24% for public companies, 22% for mixed institutions, 13% for NGOs and 7% for other private university. More than 50% of the interviewees (24) declared to be exclusively dedicated to the UFPR, as their work contract determines.

Forest engineering (65%), forestry (28%), nature conservation (20%), biology (9%), geoinformatics (15%) and environmental education (7%) were the most observed fields of study in the sample. About other background than the main area (forestry), it is worth mentioning chemistry (31%), mathematics (28%), economy (19%), physics (16%) and management (13%).

Most of the interviewees already had international experience (74%), either as student (graduate or undergraduate), researcher (post-doc), or as a professional (technician). They hold Master, Doctorate or Post-Doc degrees from universities in Argentina, Australia, Canadá, Costa Rica, Finland, France, Germany, Japan, Spain, or USA.

The majority of them are working at the UFPR in a DE (Exclusive Dedication) regime, which means that they are not allowed to work (even partially) to any other institution. However, many of them are constantly involved in consultancy projects (through partnerships of the University with other institutions), in other countries in Latin America (Argentina, Uruguay, Cuba, Guatemala), Asia (Vietnam, Indonesia) and Africa (Angola, Mozambique).

Half-dozen are already retired, but are still working as “Senior Professors” advising students and helping in projects. Some of them have had as well positions as directors of the school of forest engineering at the UFPR. And one professor (a woman!) was at the time the Coordinator of Research and Development of Science

and Technology at the Federal University of Paraná. She was also consultant, and member of boards in other public institutions at the national level (Capes, CNPq and Finep).

Many are indeed alumina from the very School of Forests where they work today as professors. This demonstrates a very endogenous career development pattern, what later is pointed as one of the main factors causing an “autophagy process”, what is an expression to regard the harmful concurrence among colleagues from a single institution.

Tools usage

The following questions of the survey (1 – 4) were dedicated to discover the usage frequency of online technology / tools. They focus on communication habits, specially in what they concern the exchange of academic material, the dissemination of scientific work, and the management of bibliographic sources.

The first question is intended to show the frequency in which modern online tools are applied for scholar communication purposes, without considering the specificity of each activity, and without differentiating "active" from "passive" users (e.g. Wikipedia). The most used tools, and the less used tools by the examined audience are the main results from this part of the inquiry.

Among the most used tools, Voice / Instant messaging (e.g. Skype, MSN, Google Talk) was the only representative, with 41% of the users applying it on a daily basis. Other tools like Social Networking (e.g. Facebook), Weblog (e.g. Blog da Floresta), E-learning (e.g. Moodle), Online Public Access Catalog of Libraries (e.g. The Forestry Divisional Library-Germany), Open Access Repository (e.g. Revista Brasileira de Ciências Agrárias), Wiki-page (e.g. Wikipedia), Feed Reader (e.g. NetNewsWire) were much less required, being daily used by 2% up to 24% of the interviewees.

Table 4 - Most frequent tools applied.

Tools / Systems	Options	Respondants	%
Voice / Instant messaging	Using daily	19	41%
Social Network	Using daily	11	24%
Weblog	Using daily	5	11%
E-learning	Using daily	4	9%

Open Access Repository	Using daily	3	7%
Wiki-page (e.g. Wikipedia)	Using daily	2	4%
OPACs	Using daily	1	2%
Feed Reader	Using daily	1	2%

Among the less used tools, Online Bookmarking (e.g. Connotea, Del.i.ci.us), Feed Reader (e.g. NetNewsWire, RSSOwl), Twitter and Google Docs were the most significant, with 83%, 78%, 76% and 63% of the audience respectively never using them. Some of the commentaries made during the application of the questionnaire helps in interpreting and understanding the low usage verified for the most modern communication systems.

Table 5 - Less frequent tools applied.

Tools / Systems	Options	Respondants	%
Online Bookmarking	Never used	38	83%
Feed Reader	Never used	36	78%
Microblog (e.g. Twitter)	Never used	35	76%
Google Drive / Docs	Never used	29	63%
Weblog	Never used	25	54%
Social Network	Never used	25	54%
Open Access Repository	Never used	19	41%
E-learning	Never used	18	39%
OPACs	Never used	17	37%
Voice / Instant messaging	Never used	11	24%
Wiki-page (e.g. Wikipedia)	Never used	7	15%
Institutional Repository	Never used	6	13%

LinkedIn is the most used social network platform, as Facebook is regarded as a “gossip site”.

In general, E-learning platforms refer to the Intranet, applied for administrative tasks and purposes (grades, classes schedule, home-work management, final reports etc). Several interviewees use E-learning platforms developed specially for distance learning courses, which were coordinated by some staff at the UFPR's Center of Forest Engineering (CIFLOMA). The UFPR hosts such courses as part of the strategy to extend the activities of the university to other environments, and for a public that normally has no conditions to attend classes in the campus.

Several interviewees had problems with the definition of E-learning. Some regard “E-learning platform" as his own academic website, used in general to gather and share material with colleagues and students, or for marketing purposes. Others refer to it as the Intranet of his own company, or either as the Intranet of the public company he works for, or as the institutional webpage of the Ministry of Education and Culture.

Few indicated the application of these E-learning systems for networking purposes (“to contact some colleague”). One interviewee was an alumnus of the University of Freiburg. He referred to "E-learning platform" as the social networking platform for foreign alumna in Germany (alumniportal-deutschland.org).

Table 6 - E-learning platform (e.g. Moodle, Blackboard)

Options	Respondants	%
Never	18	39%
Seldom	10	22%
Monthly	5	11%
Weekly	9	20%
Daily	4	9%

A similar misunderstanding happens regarding the concept of Open Access Repository. The first interviewee - a chemistry engineer working with "inventory and management of industrial waste", specially biomass to produce energy – thought that Science Direct (Elsevier) was an open-access repository / library. Others presented the same perception regarding Science Magazine, or in reference to other commercial magazines such "Ciência Hoje".

Table 7 - Open Access Repository (e.g. Revista Brasileira de Ciências Agrárias)

Options	Respondants	%
Never	19	41%
Seldom	11	24%
Monthly	7	15%
Weekly	6	13%
Daily	3	7%

Some declared to use Dropbox as a repository of material for their classes and researches. What is perceived as a lack of information literacy in regard to material sources in the online world, manifested broadly among the interviewees. Few of them also see Google Scholar, or the Capes webpage (Ministry of Science) as an Open Access repository, or even an OPAC.

Table 8 - Institutional Repository (e.g. Banco de Teses e Dissertacões-UFPR)

Options	Respondants	%
Never	6	13%
Seldom	11	24%
Monthly	15	33%
Weekly	14	30%

At this point, it became clear a great confusion caused by modern terms of the virtual communication world, such as “e-learning”, “repository” and “open access”. In general, those who understand what an "Open Access Repository" might be, refer to the CER/PRPPG, what is indeed an “institutional repository”.

Although several interviewees confused “institutional repository” with distinct library services (e.g. Capes publications, catalogs etc), most of them were certain in attributing a “seasonal” character of the usage. The consultation of repositories, for instance, intensifies at the end of the semester, or during the preparation of projects and academic material.

At least one claims to consult catalogs mostly to find new data on his field. And another one prefers to consult the catalogs direct on libraries. The usage of catalogs refers almost exclusively to the search and consult of publications from Capes (DataCapes), which is the journal portal sponsored by the Brazilian Ministry of Education.

Table 9 - Online Public Access Catalog of Libraries (e.g. Forestry Divisional Library)

Options	Respondants	%
Never	17	37%
Seldom	14	30%
Monthly	6	13%
Weekly	8	17%
Daily	1	2%

Most of them use the bookmarking tool of the browser, but this refers usually to informal searches while navigating in the Internet, without a direct connection to academic activities. Scholar gathering of information is done within more conventional tools (e.g. List of publications on a word document).

Table 10 - Online Bookmarking (e.g. Connotea, Del.i.ci.us)

Options	Respondants	%

Never	38	83%
Seldom	6	13%
Monthly	2	4%

It is interesting to note that age and position of the interviewees can be an important factor of influence regarding their habits of communication. At least one interviewee noted that his “preferred media is still radio”, which he listens everyday while driving his car. Some interviewees were already retired professors, working as volunteers for the graduate program. One of them studied in Viçosa /MG, where the School of Forestry indeed started, and was transferred to Curitiba with the School. He is alumina of the second graduated class (Master of Science) on Forest Engineering in Brazil, has Doctorate (Seatle/USA) and PostDoc (Georgia/USA) and was also a visitant researcher at the Freiburg University in Germany, on a time when the classes were given in English.

Another one, among the first women to teach at the graduate program, prefers the students to bring her the new information found in the new media channels (Social Networks, Microblogs etc). On the other hand, at least one interviewee is already using IPad to prepare and share material for his classes.

Several interviewees declared to use “extensively” Google Scholar and Wikipedia for academic consultations and searches. Many of the interviewees confessed to consult Google on a daily basis. “The first search is always done there. For academic and non-academic purposes”, or "Starting there I find everything I need", or “I use normally Google for the first search, what is responsible for a high usage of Wikipedia, as well...”. And at least one said that “the only online tool he uses is Google”.

Table 11 - Wiki-page (e.g. Wikipedia, Wikiversity)

Options	**Respondants**	**%**
Never	7	15%
Seldom	15	33%
Monthly	5	11%
Weekly	17	37%
Daily	2	4%

Among the reasons for a resistance on the adoption of new tools there is the automatic association between new tools and more work load. Another one refers to

a process of trivialization of the scientific production, what includes specially an increase in the quantity followed by a consequent decrease in the quality of scientific works. Most of the choices here are due to habit, in combination with the institutional structure of work. This helps to understand the reason most of the interviewees declared to be acquainted with Google search and mail, but ignoring Google Docs / Google Drive.

Table 12 - Online tool for creating and sharing content (e.g. Google Docs)

Options	Respondants	%
Never	29	63%
Seldom	13	28%
Monthly	2	4%
Weekly	2	4%

Tools for information exchange / sharing

This part of the research intends to point out the proportion traditional and online media are used to share academic content. More specifically, how much of the population refer to Google Docs and/or to "Intranet" among the most used. They could select up to three options, thus percentages added up to more than 100%.

It is interesting to note that several professors are still working in a old fashioned way, like the one who has a closet in the office with folders for all his classes. In this case the students are still receiving hard copies of the texts and material they use in class.

E-mail is the main online tool for information and content sharing, with 98% of the interviewees declaring to use it as the preferred form to exchange material with students and colleagues. The second option for sharing information are “lectures and informal meetings” (61%), which reinforces the impression that the communication at the examined environment is still mostly done by traditional means.

One professor remembered that he was the first to have and use E-mail at the UFPR. This happened in the 80's through his doctorate in USA, where he got to learn about new digital tools applied for communication at the campus. Another one informs that his company (engineering) has its own internal communication system, with a repository for relevant documents and literature.

Several interviewees declared to use chat and talk tools for convenience in “quick discussions and spontaneous exchange of material”, since these kind of software is usually installed as features of other often used tools (e.g. accessing Google Talk through webmail).

Google Docs is already known, although the standard is still being documents exchanged by E-mail. Most professors use the search of Google, thus in some cases it is more convenient to use Google Docs, but it is still an exception among current options (4% declared to apply it for information exchange and sharing).

They are already using tools like Dropbox, for sharing material; and some refer to use pen drive specially when the task involve the application of statistics tools for the analysis of data.

The choice “lectures” refers also to "distance learning courses". And "Conferences" in the case also refers to video-conferences done internally at the Empresa Brasileira de Pesquisa Agropecuária (Embrapa).

Table 13 - used tools for information exchange / sharing

Options	Respondants	%
E-mail	45	98%
Instant messaging (e.g. Skype)	11	24%
Social networking platform (e.g. Orkut)	3	7%
Google Docs	2	4%
Intranet (e.g. Moodle)	6	13%
Conferences, workshops, events	12	26%
Lectures, informal meetings	28	61%
Other	10	22%

Tools for publishing and work dissemination

This question intended to reveal the most used and the less used forms of publishing and dissemination, and therefore the proportion between traditional and online media in that regard. As the interviewees could choose up to four options, thus the percentages of all chosen options added up to more than 100%.

Almost all interviewees (98%) usually submit their papers at first to print-based publications, which are the most traditional and better ranked. However, they admit to be “aware that most of these publications make digital copies of the articles to be available at libraries, institutional portals and other sites on the Internet." Thus online

publication (67%) is due mostly to the publication on Print-based journals. At the end, this become a reason for focusing the publishing efforts almost exclusively on traditional print-based journals.

One interviewee commented also the following: "The print-based publications serve to be sent to remote areas, where there is no Internet yet, but where most of my researches happen. They are also convenient to be distributed in courses and other events (education)".

Lectures (37%), presentations (52%), and personal meetings (13%) where also mentioned as significant forms of dissemination, what reinforces the idea of traditional practices of the publishing culture in case. On the other hand personal (20%) and institutional pages (22%) appear timidly, and not without misconceptions regarding their features and characteristics.

Many confuse the Curriculo Lattes[1], which is the official platform for academic profiles from the Ministry of Science and Technology, with a personal webpage. And they use the page at Curriculo Lattes to disseminate their own research work, what demonstrates the effect of an institutional policy towards centralization and normalization of standards for scholars.

Only one declared to have his own "personal webpage" (private) together in the same platform as his own "institutional Webpage" (lab), where he has Forum and E-mail lists tools conjugated. He usually applies these pages for communication with students, colleagues and for marketing purposes (consultancy).

Some commented that books are today the preferred form of publishing, although they count nothing for the official academic ranking. Others mentioned "internal disagreements" as reasons for having stopped to publish on conventional journals. And a couple justified their disinterest for current publishing activities with external reasons (e.g. retirement, or work for private companies), what can be summed up as follow: "the publication of articles on journals is not relevant to my career".

Few interviewees have already applied Google Docs for editing, and discussing material with students, but never to publish articles.

[1] http://lattes.cnpq.br/

Intranet appeared as another channel for such dissemination of knowledge (Publication). This refers to the possibility of using internal communication tools for chasing audience to the works done by colleagues or students.

Table 14 - used tools for publishing

Options	Respondants	%
Personal meetings and talks	6	13%
Lectures	17	37%
Exhibitions and presentations	24	52%
Online Forums and E-mail lists	3	7%
Personal webpage	9	20%
Institutional webpage	10	22%
Wiki-pages	0	0%
Weblogs or Microblogs	0	0%
Online journals and magazines	31	67%
Print-based publications	45	98%
Online public access library	3	7%
Google Docs	0	0%
Other	3	7%

Tools for bibliography management

This question intended to show the most used and never used tools for referencing and bibliographic management. In that regard, the proportion between “userbased” and “webbased” tools are of special interest, since they indicate a degree of advancement of practices (local x remote systems). This can also points the degree of trust and confidence in working with most modern tools towards collaboration.

In general the interviewees declared to use the text editor manually to edit and manage bibliographic lists and references for articles and academic material. Many of them said to be more confident when “managing manually the bibliography”. Others attributed to lack of time and resources the reason they are not trying the application of more efficient and modern tools available. However, a couple of the interviewees informed to be already familiar with bibliographic systems of text editors such OpenOffice, or EndNote, or Mendley Desktop.

Table 15 - used tools for management of bibliography

Options	Respondants	%
LaTex	0	0%
Text editor (e.g. OpenOffice, Microsoft Word)	46	100%
EndNote	1	2%

Zotero	0	0%
Citavi	0	0%
Del.ici.us / Connotea	0	0%
Other	2	4%

Core characteristics of current research collaborations

This part of the inquiry brings about an estimation of time dedicated, and/or output from research activities according to three core characteristics of collaborative work:

- Distributed team, researchers working at distant places;
- Interdisciplinary topics, scientists working in different disciplines;
- Multi-institutional structure, projects in cooperation among institutions.

They are considered ideal conditions for online collaboration (distributed, interdisciplinary, multi-institutional). More than 70% of the interviewees declared to have less than 50% of their efforts related to activities with the three inquired characteristics. Specifically, 81% said to work a maximum of 50% of their time with distributed teams, while 78% said to dedicate from “nothing” “up to 50%”of their time/effort to multi-institutional projects, and 64% said the same regarding interdisciplinary topics.

Table 16 - Within a DISTRIBUTED team

Options	Respondants	%
100%	3	7%
80%	6	13%
50%	16	35%
20%	16	35%
Nothing	5	11%

On the other hand, several interviewees noted that the inquired characteristics are increasingly becoming more frequent, and therefore important in the fields they work in. Few of them admitted certain pressure / incentives to increase the work on distributed and multi-institutional projects.

Although the inquiry could not explore the details of the characteristics and the direction into which such tendency seems to evolve, it is possible to conclude that collaborative efforts happening at the CIFLOMA involve more interdisciplinary topics, than distributed teams and multi-institutional projects.

Table 17 - With MULTI-INSTITUTIONAL structure

Options	Respondants	%
100%	5	11%
80%	5	11%
50%	14	30%
20%	18	39%
Nothing	4	9%

In comparison with the data about tools usage from the previous questions (1-4), the mentioned trend could not be corroborated. On the contrary, the conservatism of users regarding modern online tools may be a justification for the timid appearance of the three core collaborative characteristics in the examined audience.

Some professors draw attention to the fact that many research projects and activities also have a seasonal character, becoming more “intense” during certain periods of the scholar year.

At least one interviewee declared to be not sure about to what extent her work is collaborative, because they are not motivated to be aware of such things (“It does not matter to my work...” - 19th. Interview). This denote a lack of clear incentives and measurements regarding work assessment, or a lack of means to value collaboration at academic environments.

Table 18 - On INTERDISCIPLINARY topics

Options	Respondants	%
100%	7	15%
80%	10	22%
50%	9	20%
20%	15	33%
Nothing	5	11%

Characteristics of collaborative writing and publishing

This part of the survey explored the experience and perception of scholars when writing and publishing academic texts. It encompasses 7 questions, from the number of articles written per year, number of co-authors, tools applied for collective writing, up to perceptions on publishing culture and intellectual property.

Most interviewed academics write between 1 to 5 articles per year, which is in accordance with the mandatory requirement from the Ministry of Education (Capes)

of a minimum of three articles published per year. Many of the interviewees admitted to publish only half of the written articles, attributing this to a combination between a “weak” qualification of some co-authors (usually students), and a “deluge” of papers occurring currently.

Around 22% of the target group declared to write from 6 to 10 texts, and 4% of them from 11 to 20 papers. Only one interviewee admitted to have written no article during the previous 12 months, justifying the attitude with overload of work. He was trying to complete his dissertation (doctorate, which in the Brazilian system is called "thesis").

Co-authorship

All professors write texts collectively with other fellows, with 90% of them writing “all” or “almost all” articles in co-authorship. The co-authors in case, usually are the graduate students (doctorate and master), with very few works being pursued in partnership with other professors or researchers.

The size of the academic network for co-authorship vary from 1 until more than 20 fellows, but the majority (61%) declared to have a network from 4 up to 10 co-authors. Only 15% informed to have networks with more than 20 collaborators. Again, there is an indication that most of the professors use graduate students as co-authors, to the extent that it is appropriate to meet the mandatory requirements of the Ministry of Education (Capes).

Regarding the tools applied to perform collective writing, E-mail appears almost alone among the options with 98% of the interviewees pointing it as the preferred form. Only 9% have tried to use Google Docs for collective content production, but in most of the cases they were faced with technological (e.g. systems incompatibility) or cultural (e.g. lack of acquaintance) barriers.

Some of the interviewees declared to use tools like Dropbox, MegaShare or even a pen drive when dealing with big files, with many graphics and drawings.

Skype is basically applied for discussion about the content under construction, but discussions normally never happened on the article itself (e.g. inserted commentaries)

Openness and transparency

This part intended to shed light over the extent of “openness” among authors, in special professors of the graduate program of forest engineering at the UFPR/Brazil. They were questioned if they had published their “work in progress”, with five options of answer:

- Yes, publicly
- Yes, within my research community
- Yes, within small network of collaborators
- No, but I intend to do in the future
- No

"Online lab notebook", or "weblog" were also considered as working in progress. While 24 academics (54%) answered they don not publish their “researches in progress”, only one declared to do it “publicly”. The others 21 interviewees declared to only share their “early results” with collaborators and fellows.

A majority of the interviewees are still usually disseminating their work at first on conferences and congresses. Few of the interviewees use the page of the laboratory where they work to disseminate fresh information from their researches. Several academics do not publish work in progress, but write and submit preliminary findings (work in progress reports) as a mandatory requirement of the research funding agency (bureaucratic requirement).

A couple said to not have chance to publish work in progress, due the publications where they usually submit texts do not accept uncompleted work. And one justified this attitude because he “sees no advantage”, since it has no official value to the academic records.

Piracy and plagiarism

Regarding the creed on piracy and plagiarism, they were asked about the extent they agreed on the existence of a risk that other researchers were likely to steal their work if they would publish it online. The five options intended to reflect a degree of perception about the topic.

All showed a clear opinion on the subject. Around 60% (28) respondents disagreeing (moderately or strongly), and 18 (40%) agreeing about the risk of work theft in consequence of online publishing. No one chose the “no opinion” option.

Most of them share the idea that publish ongoing research has two sides: a risk and a opportunity. The risk is related to the threat that someone may take and use your information / data as his own material. The opportunity regards the possibility that through it some potential partner may find you.

Few professors, who were publishing their ongoing work in scientific journals, attribute this “more open” attitude as a characteristic of the field they work in (economy), where there is no output to be object of patent register, or where intellectual property issues do not play any decisive role. For them only the citation of articles was important.

Others declared to prefer to publish completed works not for fear of plagiarism, but just to present something more elaborated. They said that partial results were not helpful in the field of economy.

Most of the interviewees justified their answers saying that the issue is of a "cultural or social” matter. According to them, it is simply the standard procedure to not expose the work or material under construction or analysis.

In that regard the professors at CIFLOMA showed a divided opinion about feeling threatened by the "openness" and "transparency" characteristic of the "online" communication. While some believed that publishing working in progress (specially data) includes a great risk of data/information theft, others demonstrated to not worry about that risk.

It is to say that some prioritize the warranty with respect to authorship, but there are also those who “do not care” if someone else take and use their information or data. And this seems to depend on characteristics of the field where they operate, on institutional norms, and on personal interests and goals.

At least one mentioned a necessity to escape the “cluster culture”, represented by the traditional form of academic publishing (journals). Characterizing it as a “endogenous” culture, he publishes books in order to avoid this standard behaviour.

Barriers for collaboration / co-authorship

This part of the survey intended to indicate the relevance of a set of barriers / problems for the ripeness and further development of collaboration among fellows of the examined audience. This includes the most relevant problems for co-authorship,

and if it is possible to determine any clear pattern regarding barriers for writing papers in collaboration.

Each one of the seven suggested barriers had five options of answer (very relevant, relevant, less relevant, irrelevant and “I don't know”). For the present investigation I considered only the “relevant” and “very relevant” choices, using comments to explain the most significant barriers.

Table 19 - Barriers for collaboration / co-authorship

Barriers	Options	Respondants	%
Unorganized information flow	Relevant or very relevant	34	74 %
Lack of incentives for collaboration	Relevant or very relevant	31	68 %
Bureaucratic requirements	Relevant or very relevant	27	58 %
Information deluge	Relevant or very relevant	23	50 %
Spirit of concurrence	Relevant or very relevant	19	41 %
Dialog isn't easy at virtual environments	Relevant or very relevant	19	41 %
E-tools aren't trustful	Relevant or very relevant	14	31 %

The unorganized flow of online information appeared as the most relevant problem, with 74% of the answers pointing it as “relevant” or “very relevant”. But since it is attributed to a set of contextual, and therefore structural matters, the interviewees declared that this is not a problem in itself, but a consequence of a series of other issues that must be solved at first. The item “trust and dialogue” (41%), for instance, is one of these “other issues”, since it depends on the literacy and intimacy with the tool / media.

The lack of incentives (resources and policy), in combination with other factors (e.g. bureaucracy), is seen as the biggest barrier for the further development of scientific collaboration /research. Some mentioned that bureaucracy creates its own life, and at the end, the people were simply agreeing with it in order to manage their own interests.

Table 20 - Bureaucratic requirements for research documentation

Options	Respondants	%
Very relevant	20	43%
Relevant	7	15%

Less relevant	15	33%
Irrelevant / Not applicable	3	7%
I don't know	1	2%

Several professors have declared that “concurrence is an incentive!”. However, they agreed that it is fundamental to impose limits to it. Others have referred to the spirit of concurrence at academic environments as a "rain of egos" (chuva de egos).

Table 21 - Spirit of concurrence at academic environments

Options	Respondants	%
Very relevant	14	30%
Relevant	5	11%
Less relevant	9	20%
Irrelevant / Not applicable	18	39%
I don't know	0	0%

Confronted with the question about professors' attitudes when collaborating without direct interests for their careers, one of the interviewees replied that "it depends on the size of everyone's soul". This same professor believed that academics "were becoming more bureaucratic".

Another professor, working for a public company, raised the issue regarding the limitation of the number workers, and consequently the staff's lack of time. Indeed, bureaucracy is a must at the company he works for (Embrapa), what represents a great deception, since it demands a lot of time.

It became clear that the difficult part with the digital media is to build the network among people, afterwards the use of any tool to communicate is not that problematic. It means, the barrier is still on persons, not on the machines or systems.

5.4 Qualitative Data

This chapter contains the description of the information collected at an in-depth interview made in parallel with the application of the survey. It explores the reasons (interests and motivations) behind of the answers given for the quantitative inquiry.

It encompasses six questions focused on individual justifications for the adoption of certain tools, methods, systems and attitudes regarding communication, collaboration and co-authorship. The questions also aimed to explain how institutional policy and cultural context may affect decisions of academics when working in collaboration with their fellows.

The answers can be divided in three main streams of analysis:

- Technology (tools);
- Institution (policy);
- Culture (habits).

They are presented according to the questions sequence as follows. The answers were selected considering a balanced point of view in what they concern a logic sequence of reasons for the found reality.

Reasons behind the choice of communication tools

The question intended to shed light over communication habits and procedures at the examined academic environment. Examples and opinions were important in order to reveal interests guiding attitudes, as well as institutional norms shaping the know-how of scholar communication of the given audience.

“Lack of time” appeared as an ubiquitous complaint, the most common factor influencing the audiences choices for certain tools. It is to say that they do not have time to learn and try out using new modern and more efficient tools, nor they perceive any advantage in changing their current habits of work in regard of tools usage.

On the other hand, such justification seems to function in combination with other factors like “lack of formal requirement”, or “lack of awareness for communication issues”, what is also seen as a “lack of priority” from the university's administration in

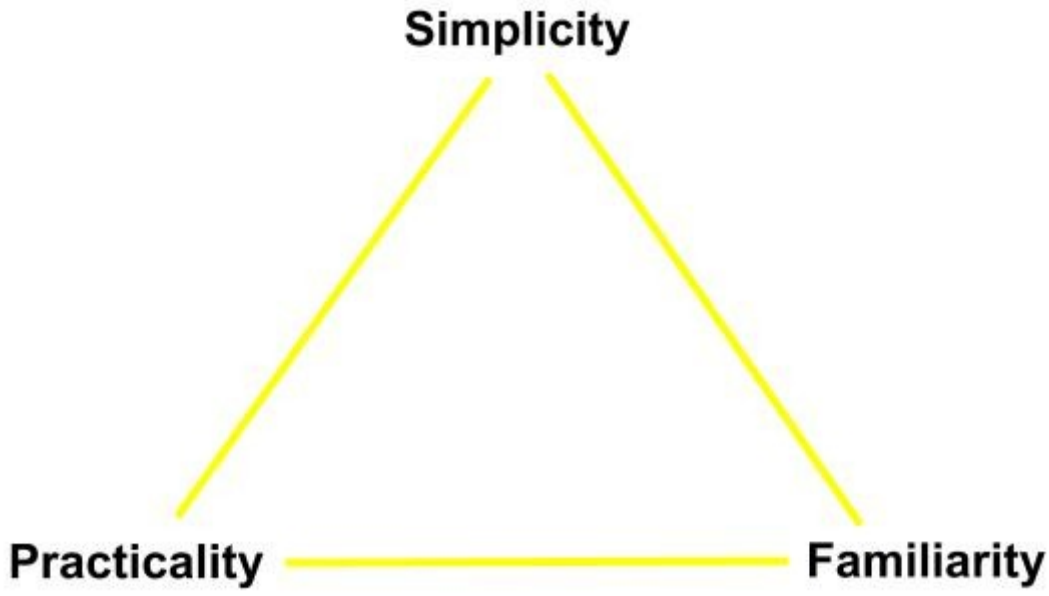
regard to the adoption of more efficient (transparent) ways to perform the academic work in case (e.g. writing, authoring).

The factor above is similar to “lack of infrastructure”. But this last one implies a consequence of certain policies or decisions previously taken, while the former relates directly to intended results of a formal policy in place.

From a cultural point of view, the most relevant answers relate to factors such as “personal convenience”, “complacency”, “contextual inappropriateness”, “culture of individualism” and “self-indulgence”. Many interviewees believe that the current publishing culture is still prioritizing the traditional way to disclose academic works in print-based publications. According to them traditional publications are still holding an aura of importance and credibility that pure online vehicles do not have. Furthermore, the administrative and bureaucratic system responsible for the assessment of academic endeavors is still promoting this belief.

Finally, it is relevant to consider that all professors interviewed were not raised in the culture of digital technology, what seems to justify their uneasiness with virtual communication. However, the technological illiteracy appears as a less relevant problem in expressions such as “generational inability”, when it regards few older fellows of the examined audience, or “lack of user-friendliness” in what it concerns the design and usability of modern online tools. For the most experienced interviewees, the equation between technological literacy of the audience, and the usability of tools can be represented in a tripod of factors, as showed below.

Figure 5 - The tripod of factors influencing tools usage according to experienced users (Senna da Costa, 2014)



In the schema “practicality” relates to pragmatic and objective use of tools. They must perform needed tasks. While “simplicity” speak for the avoidance of tricky operations, that in many cases become a barrier for the broad adoption of tools. Finally, “familiarity” is related to the level of acquaintance of an audience to certain tools. The example of E-mail is a best practice in case, since several new tools (e.g. Google Docs) were developed taking an already used tool as reference.

Interests and motivations for publishing academic texts

The question aimed to explore the perception about the importance of publishing scientific texts to the academic career of professors. Also if there was any difference on impact between single authored and co-authored articles.

Academic publishing

First of all there is an almost unanimous consensus that publishing activities have no direct relation to the reputation of a scientist in his field. This answer can be explained by the fact that Forestry in Brazil is a field pointedly marked by a predominance of industrial and commercial interests. Cooperation projects between universities and companies, mostly manifested in consultancy contracts serve here as evidence, with all professors interviewed working under such contracts. These contracts are made possible through the intermediation of foundations like FUPEF (Forestry Research Foundation of the Paraná State). It is a private non-profit institution, supported by the Federal University of Paraná (UFPR). The FUPEF's headquarters lies in the CIFLOMA's (Centre of Forestry and Wood Sciences) building, where the Graduate Program in Forest Engineering is also hosted.

Furthermore, the publication of articles is perceived as only institutionally important, but not personally to the scientist. At the end, many of them declared that publishing does not directly cause any improvement in the conditions of work (funding, scholarships, institutional infrastructure, career promotion and tenure). It is actually seen as only one among many other forms of performance evaluation.

The exposed above seems to reveal a contradictory perception from professors about the topic. In reality, there is an indirect correlation between publishing, career progression and funding access established by the current system of academic

performance assessment. Publishing is the “only concrete mean” to assess the professors' work.

Actually, records of publication and institution's position on the ranking system, based as well on quantitative indexes, are the main criteria for academic assessment. For the graduate program of forest engineering the number of articles published in well ranked journals is almost the exclusive criteria (because of the weight it receives) for assessing academic performance.

Professors who do not follow these criteria were excluded as teachers of the program, and the institution may receive sanctions (e.g. loose position in the ranking), what also affects the chances to access funding sources (scholarships, project grants, and investments). The interviewees refer to it as a “chain process”, or “cascading effect”, because a professor when excluded from the program can not advise students anymore, what makes their publishing efforts much more difficult, since they (professors) write texts preferably in co-authorship with graduate students.

In general, the interviewees were aware of the premise that publishing is a way to share the knowledge produced by researchers. Some refer to publishing activities as “the retribution of the researcher to society” (36th.). Others admit to use publication of articles as a marketing tool for consultancy and services. And there are those who see publishing papers as a test about what they think they might know. They consider publishing a concrete way to show what they have done.

But they also admit that the way publishing activities were being currently compelled does not add any real progress to our knowledge. Most of them believe that the research at the university is lacking innovative discoveries for this very reason. In other words, scientists are publishing only in order to attend the requirements of the institution. They are not working according to truly scientific principles. The current evaluation system emptied the significance of the research output.

Another important aspect for the present investigation is the fact that staff members of the graduate program have primarily the obligation to teach. This relates to the fact that graduate programs according to the Brazilian legislation are dedicated to produce and qualify manpower / professionals. Research work is, therefore, a secondary attribution. But even though, publishing papers is the prevalent parameter

to evaluate professors' performance. In this context publishing is done mainly to attend professors' (intellectual and bureaucratic) and students' (learning) needs.

In most of cases, publishing happens only through the advisement of graduate students. It is to say that usually students write and research (hard work), while professors advise and review the texts (guidance, review and insight). Professors themselves admitted to “use students” in order to get the required number of articles published. In this context, publishing scientific papers is perceived as a “side effect” of the learning activity (advising graduate students).

This relates to the interests of professors in teaching at a graduate program. Since in the graduate program you have smaller classes, where students are also assistants of their advisers. Therefore, such interdependence helps professors attending the requirement of compulsory publishing.

Besides publishing, professors' career progresses also by engaging in administrative positions, what depending on the level, could result in some upgrade in the salary.

Assessment criteria

“Data CAPES” is an online report every professor must submit annually. It aims to evaluate the production of academics (professors and students) of a graduate program. Number of published papers is the main criteria. This specific number defines the number of students a professor can advise in a graduate program. Every year, for at least three years, a professor must have an evaluation of at least 100 points (B5 publication = 10 points).

If the staff does not follow the quantitative criteria given by CAPES, the entire program get its grade reduced, which means less chances to compete for resources (e.g. number of scholarships).

In 2011, the graduate program of Forest Engineering at the UFPR was reduced from grade 5 to grade 4 (1 to 7 score). This resulted from several professors that did not achieved the minimal number of published papers. Among the discrepancies pointed, it is relevant to mention that such criteria does not offer means to differentiate important factors like sub fields characteristics, institutional structure, nor socio-economic context (e.g. assess bigger and small institutions without differentiation).

Qualis is a system developed by CAPES to classify the academic journals that are significant for the Brazilian scientific publishing context. It is based on the ISI system (Web of Science) and uses almost exclusively quantitative criteria to create its indexes (impact factor) and rankings.

The main criteria for the evaluation of professors and students is the publication of articles in indexed journals. For professors, a second criteria is the number of students under advisement. Therefore, what is important to CAPES is that professors and students are publishing together, does not matter what and with which quality. The number of publications speaks for itself.

Qualis index does not have any mean to assess the text quality, the merit of the topic, much less the relevance of the information published for the advancement of science. At the end, it overstates the importance of the international research over national research effort, does not matter how good and important it is.

For example, a professor needs 210 Points in the Qualis index, in order to be allowed to teach in the graduate program of forest engineering. The publication of one single article in a journal classified as A1 (only international ones) renders 100 points. For most professors this is one of the discrepancies of the current system, representing an imbalanced concurrence with international research institutions.

Prof. Dr. Graciela Ines Bolzon de Muniz, Coordinator of Scientific Research and Technological Development of the Federal University of Parana, and also staff member of the Graduate Program in Forest engineering explained the main mechanism of academic assessment. For professors the main criteria is the "intellectual production" (40%), and in the Forestry certain characteristics of the field justify its own criteria. For instance, conferences and congresses are not considered exactly because of the characteristics of the field, very close to industries and others direct economic interests. It means that if it would count anything (e.g. congresses) it would experience a great amount of research initialized but never finished, just in order to present few results in conferences.

On the other hand, for students the conferences are counted. It is different in Informatics, where congresses count for students and professors. She believes that the current criticism over the academic assessment is due to that everyone always try to justify their own interests.

According to her, there is a policy of research at the UFPR, as at any other public university in Brazil. What is happening is that the UFPR does not have properly a research policy for the Forestry Engineering. One of the reasons refers to the nature of the field, much related to practical applications and in many cases working under the guidance (consultancy works) of the industry.

There is also a issue of the vanity or power, where certain professors control a whole sub-field in order to defend their own interests.

Co-authorship

To write an article alone is perceived as an obsolete practice, inconsistent with the core principles of scientific endeavor. Thus, working with other people is obviously easier, specially in the sense of sharing the investigation and writing effort.

Similarly, there is a perception that co-authored texts are in general better elaborated and more relevant, being inherent to the scientific enterprise. They are seen as having more robustness and better quality. On the other hand, they do not represent any difference to career development. No relevant difference in value and recognition between single-authored and co-authored texts was verified.

“Updating knowledge” appears as an ideal form of motivation for professors writing texts in co-authorship, what is manifested as well in the “exchange of ideas and perspectives”. However, most interviewees sees that the current publishing culture disregard relevance and significance of the content.

Quantity X Quality

Publication credibility is related to its historical level of quality. In theory you borrow the credibility when publishing an article there. This is the logic adopted by Capes and CnPQ, where the index (quantitative) is a proxy of this historical level of credibility / quality.

In this context, traditional publications, which happen to usually be the better ranked ones, are perceived as filters, or parameters of quality. Several interviewees referred to the submission of papers to well ranked journals as a “test of quality” or a “credible basis”.

However, most interviewees focus specially in the quantity of articles, what is related to the bureaucratic requirement of governmental agencies responsible for regulating and funding graduate education. Considering the absence of objective criteria of quality, professors in general apply personal interests to determine in what articles they will be authors or co-authors. It is to say that the final quality of the work professors and students do depend directly on their personal interests and values, but also on the context in which they act.

And the context in case is one based on competitive standards, where collaboration is merely a tool to increase performance. Co-authorship for instance, became a compulsory choice, where professors are co-authors of students they advise, and both having a strong interest in simply publishing a certain number of papers to attend institutional requirements. The inspiration and motivation to write a text is not a romantic or idealistic one, similarly to the relationship among collaborators.

The few interviewees who mentioned a relation between their research work and the goal of producing something valuable to society, were the same advocating / defending the open publication of results, independently from where it should be published. But also admitting that “personal goals” play a decisive role in it.

There is a clear difference depending on the sub-field in which professors are working. For instance, forest economy has usually no research output to be object of patent register, thus publication of data from ongoing research does not poses any threat. It represents merely a formal way to assess their work, where citation is the main criteria of evaluation applied by the university's administration. Publishing indexes are still being the main mandatory assessment mechanisms applied by CAPES (career progression) and CnPQ (research funding).

It is to say that for professors working within economic topics, the “research visibility” accessed on behalf of published articles is the main interest linked to authorship. There is also a practical differentiation regarding the significance of “visibility”. It can refers to “work recognition” or “contacts acquisition”.

Some were even trying to articulate new parameters to define and value co-authorship, but with no exercise of criticism about the most important aspects of the current system (e.g. advising is not authoring). And these are indicators for the problems currently manifesting in the examined context.

In fact, co-authorship, like publication, has become a practice of convenience. The difference is that publication is a mandatory requirement, while co-authorship don't. Even though, it is possible to classify it accordingly as “individual convenience”, “institutional convenience” or “political convenience”.

“Self-plagiarism” is an example of an individual manifestation of convenience. It happens when a scientist takes certain information or data and presents them in different formats or structure aiming to increase his publishing records. It is more a trick to content competitive pressure, rather than a crime itself.

Even if co-authorship carries no negative social stigma, like self-plagiarism, a similar analysis can be made about the “compulsory authorship” of professors, what refers to the situation in which students may be obliged, or induced to add advisers compulsorily to the co-authors list, or simply to cite their works. This is similar to when the coordination of projects or institutions demands to be among the co-authors, in what is called “hierarchical tacit agreement”. Again, it is not a crime, it is more a trick for the current academic ranking game.

Another form of individual convenience, but that also manifests on an institutional level is the “targeted authorship”. It refers to the situations in which a renowned institution or researcher is sought as participant / co-author in order to improve the visibility of a research project.

The most common motive fueling individual convenience is the “exchange of personal favors”. This happens when colleagues establish to add each other as co-authors in order to increase the quantity of research output of the group as a whole. It means, each researcher write one article, but they appear as co-authors in each others work doubling their academic records.

The great majority of interviewees see a direct relation between the above described practices with the recent trends in academic publishing caused by the adoption of indexes and rankings as the main evaluation form. According to them tendencies known as “publish or perish”, “papermania”, “publishing race”, “industry of articles”, in combination with traditional careerism prompted the trivialization of such unethical behavior. Some of them also consider the political spectrum of the country, where impunity is an old brand.

They say that competition, regarding the number of articles published, affects greatly the quality of the content of scientific publications. It responds for the publication of irrelevant information only to attend the bureaucratic requirement of a minimum number of papers per year. Consequently, most productive scientists are professionals of publishing, but do not work as scientists anymore, ceasing to work for the advancement of science.

Publishing results of research work in the graduate program has a formal and bureaucratic character, what also reflects in the significance of the content produced. Publishing is indeed related only to the number of articles, with no regard to the quality of information or knowledge generated.

Some professors explain that publishing is not the main goal of a scientific career. Indeed, this contradicts the traditional objectives of science (discover, learn, reveal). According to them, this obligation to generate numbers turned academics into “slaves” of the establishment, limiting their flexibility and creativity. In such a context, academics do not have time and energy to care much about the relevance or importance of the content they produce, and this functions discouraging the devotion to the advancement of science.

It is important to explain that the results presented above do not undermine the idea supporting collaboration as a fundamental feature for scientific advancement. But they show clearly that the current standards and methods assessing work quality and performance are compromising the role of important tools, like co-authorship.

Power of context

Many of the interviewees demonstrated a frustrating perspective of reality, where they feel powerless to change the current direction of academic work. According to them, the current assessment model inverts the importance of professors and researchers role. This refer to the fact that professors' work is being evaluated according to the performance of researchers' work (publication of papers). Few testimonies help in understanding the extent of the dissatisfaction:

> “We are living in an era of “feudal-individuality”, where quantity is dictating the norms, and defining who is receiving more incentive” (10th. Interview).

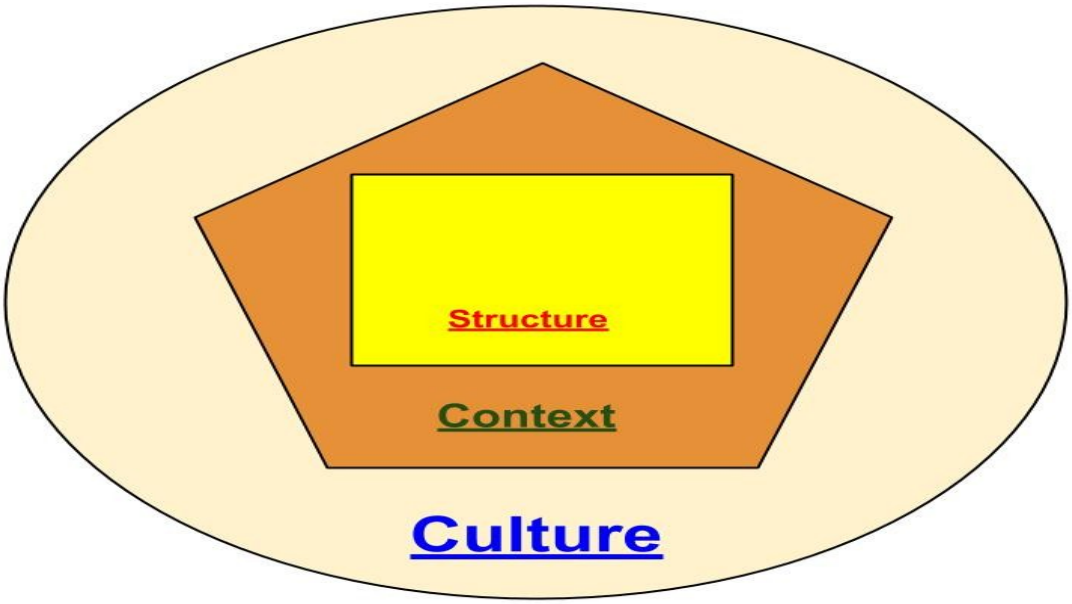
> “I am not motivated to stay in this academic environment, where we have always a pressure, a competition for space, power and a culture of vanity based on nothing really valuable”. (39th. Interview)

A different case in this discussion are the so called “senior professors”. Since they are already retired, they do not have any impact on their career from publishing records. But they admit that visibility and recognition are still decisive motivational factors (impact on their egos). Vanity is a prevailing factor in academic life.

Books are perceived as “more appropriate” vehicle to prompt interdisciplinary science, or to get out of the “cluster culture”. According to the interviewees, books offer a better way to communicate knowledge in a structured and organized form. In other words, to write a book, or chapters of a book is considered a natural scholar task, requiring a more profound and broader intellectual effort, rather than writing a paper, which has currently a more “bureaucratic” and “superficial” character. Strangely enough, the publication of books does not have any value to a professor's career on forest engineering.

There is no Brazilian publication on the area of Agriculture with the score ”A” in the ranking of journals. Thus, the internationalization of indexes of impact reduces the significance of the research output on the examined audience. One of the reasons is the regional focus of most of research projects going on at CIFLOMA. In that regard, most professors do not see any sense in certain criteria, like the better performance assessment attributed to texts written in English. The interviewees attribute the adoption of these indexes as a way to content international demands and trends.

Figure 6 - Graphic representation of the relation among “structure – context – culture” (Senna da Costa, 2014)



Alternatives for publishing academic texts – The Open-Access case

The question intended to verify the impact of the Internet in the publishing culture investigated. Specially in what it concerns the perception of the audience about the "open access" publishing phenomena, its advantages, and the potential created by collaboration via Internet.

Most of the interviewees demonstrated no acquaintance about open-access publishing. They could not list any OA publication, neither describe how such publishing form currently works, and much less the roots of the OA movement. Some believed that Scielo and Google Scholar were OA's sources.

Many assumed to have a certain discomfort with the idea of publishing openly all their works. Some raised the possibility that this could give too much public exposure, and others justify the disagreement with the possibility that open publishing could create more confusion about the work's quality / accuracy. In general, there is a perception that to make things more open also imply an increase in the risks.

This relates to the idea of traditional publications having a consolidated, therefore more trustful, quality criteria.

The absence of a national guideline for open publishing is also responsible for the absence of open publications on a national level. There is no initiative like the PLOS in Brazil, what could better serve to the main interests of researchers from Brazilian universities. The main reason points to the historical and ideological dependency of most educational institutions of the country from international initiatives and solutions, what refers again to the “mongrel complex” mentioned at the “Brazilian context” chapter (pg. 74).

Even if most journals in the Forestry field have an open access policy (Green or Gold strategies), they are structured separately by each publishing institution, which are indeed competing among each other for Federal funding. In fact, we may not ignore that institutions are structures of power and thus act first according to its own interests instead of the collective.

It seems that a mix between habits, institutional culture and traditional ideology of publishing is impeding the total development of a Open Access culture for science. And as Open Access demand a complete different approach to content management, it makes almost impossible to traditional publishers to engage themselves in a such broad change in their markets without an intervention or guidance given by the national legislation and policy.

Furthermore, most of Brazilian researchers can not write properly in English, and this becomes a major barrier to the development of an OA publishing culture in the country. Again it represents a manifestation of a vicious circle.

Another barrier is of a more bureaucratic nature. It is due to the rule that establishes that costs of publishing (e.g. translation, review and publication) can not be included in the funding application to official agencies (3rd. Interview).

Even when studies relate to issues concerning the local reality, researchers are “coerced” to publish in vehicles with good indexes (Qualis system), what are directed exclusively to the expert audience on a regional or national level. Even though, few researchers declared to publish their work results on publications (layman, press media etc) that are not officially ranked. And they do so motivated by an altruistic belief of giving something in return to society that is in fact the main source of their public funding (e.g. job at a public university).

Thus the professors' preference for traditional / print-based vehicles when publishing is artificially sustained by the mandatory requirement of academic ranking performance. Again, this refers also to a context in which individual “time” and “necessity” are decisive factors.

In that regard it is possible to divide professor's interests in two opposed frameworks. The table (22) below helps in visualizing the relations between them:

Table 22 - Relations between competitive X collaborative attitudes (Senna da Costa, 2014)

ATTITUDE	More competitive	More collaborative
QUALITY	Egoistic	Altruistic
INTEREST	Better position	Better connection
TARGET	Well ranked publications	Appropriate audience

The schema above represents the links between attitudes, quality of behavior, personal interests and goals. A more competitive attitude implies an egoistic behavior, what is represented by an interest for seeking career progress, what can be achieved under the present assessment system only by seeking publication on well ranked journals. Furthermore, this table represents an experimental formula to relate scientists' attitudes and behavior according to two opposed frameworks (Collaborative X Competitive).

Professors in general prefer to submit their papers to publications with higher score in the Qualis system. This is due to a necessity to balance the goal of sharing knowledge according to the resources and time available, with the institutional requirements. Such set of conditions makes the OA publishing practices to lie outside the scope of professors' priorities. Or in other words, efforts to produce and share knowledge are concurring with the requirements to advance in the academic career.

“Dictatorship of indexes”, is an expression to regard the current reality of the examined publishing culture. It refers to the mandatory requirement to publish papers on publications endorsed by certain international indexes. Others mentioned the “corporate bias” caused by rankings. They are perceived as “products” that can be manipulated in order to attend their private interests (e.g. profit).

Very few staff members admitted that there are good OA publications that have no value for their academic career. Due to the ranking system, most professors publish their texts exclusively on well indexed vehicles. Otherwise, they declared to be afraid of “wasting” their effort, because o the rule of exclusivity for the submission of texts to scientific journals.

Yet, a couple of them justify their skepticism declaring to see no professional appeal on OA publications (e.g. no clear proceedings, no editorial board). They regard Open publications as “less credible work”. In this sense, they also blame the proliferation of new vehicles, specially in Internet, for the decrease of the average quality of scientific content published.

The testimony of one professor helps to demonstrate another problem. A so called “hidden barrier” to interdisciplinary work represented by the current system of indexes. She declared:

> “I work on remote sensing and geological sciences. Therefore, I know and have good relations with the staff of reputable publications on these fields. My problem is to be located at an institute of agricultural sciences (Forestry). Thus, my publishing activities outside agricultural sciences field render much less impact, or no impact at all in my classification under the Qualis index. On the other hand, publishing an article about the utmost technology of remote sensing in a journal of forestry would have a very reduced visibility to an appropriate audience”. (19th. Interview)

The criteria of “originality”, which encompasses the concepts of “uniqueness” and “exclusivity”, is also a barrier to OA publishing. Publishing even parts of research work before its formal and administrative evaluation (traditional publishing) can compromise the originality of the work. Most of the interviewees consider this idea of original work as a “myth”.

The time out between submission and publication (up to 2 years) is also an issue.

Only one professor referred to piracy as a problem also caused by the OA publishing trend. But the promised advantage of a broader and wider audience from OA publications is still a “hope for the future”.

The interviewees share almost a consensus that OA publications are still missing mechanisms to ensure the quality and relevance of content and audience. On the other hand, the non submission of papers to OA journals is due to the bureaucratic requirement imposed by regulatory institutions as the main form of evaluation of the research work. Who challenge this rule, gets “punished”, and his efforts are not

officially recognized. And this happens although it is widely known that the ranking has no direct relation to content quality of any publication.

Authors that are not focused exclusively on formal evaluation of academic performance tend to chose publications according to other criteria (publication timeout, audience, regional scope etc). But rarely they will spend time in publishing in OA publications, since in the forestry field these vehicles normally do not count any point to the formal evaluation (an attitude to “maximize efforts”). Publishing OA, therefore, would require more effort without giving anything in return.

Professors mentioned a need for new vehicles, appropriate to the context (local knowledge). This includes new criteria of assessment, what should also consider the “social” value of research. They suggest a change in the publishing culture. It would serve as a counter weight to the current system, which is articulated on a global scale, promoting the international perspective over the local interests.

At this point it is possible to establish two opposite approaches / motivations towards publishing activities. They are:

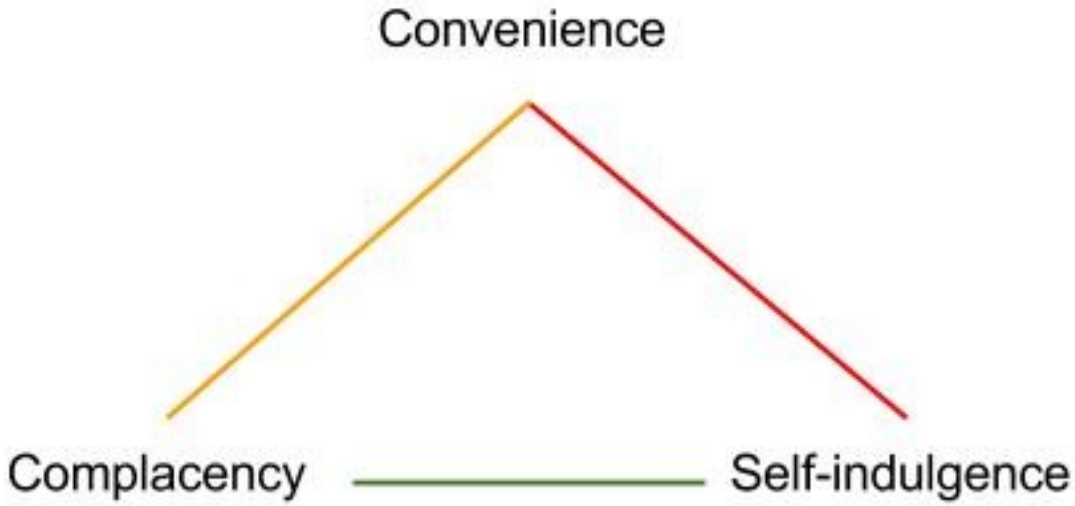
1 – Publishing to advance in the career;
2 – Publishing to communicate something valuable.

In that regard it is important to consider few aspects raised by the interviewees. First, traditional publications operate like closed societies. Just content quality or relevance do not ensure acceptance and publication. Good contacts and persistence are fundamental. Second, the pursue of administrative requirements for publishing (academic rankings) works against pure scientific goals. This helps to understand the poor quality in terms of significance, relevance and specially innovation found currently in most of traditional publications in the field.

“It is in fact a huge waste of time and resources from the scientific point of view”, declared one of the most experienced interviewees.

Again, It is possible to draw a triangle of factors that are influencing the choice of publications to submit papers. It helps to visualize important issues and invite insights to understand several problems regarding the current publishing culture:

Figure 7 - Tripod of factors influencing the decision process regarding publications (Senna da Costa, 2014)



The current criteria of assessment (journals and articles) do not reflect quality of research work. It is much more a matter of convenience and exchange of favors. At the end, the quality of the publication is not a proxy of the quality of the research it is publishing. The progress of science must come first of the career progress. Most relevant works wait years to be published. And these are only a couple of the bad effects of the current system.

The homogenization and bureaucratization process of research work (Dechert, 1970 / Maniates, 2003) – Professors require their graduate students to publish a minimum number of articles in specific publications in order to generate the points they (professors) need to be allowed to teach on graduate programs. Similarly, market visibility (appropriate audience and scope) is a core intention behind the choice of publication by professors with commercial interests. In such a context, most significant journals are merely a matter of career assessment and development. It has nothing to do with proper scientific visibility and broader distribution of information. Students are also under the influence of the same system, but with different criteria.

Finally, OA publications are still irrelevant for the work of professors at the CIFLOMA. In order to make the information free it is not enough to motivate scientists to adopt OA vehicles. It is fundamental to define appropriate goals (for the research and for the scientist) accordingly.

Motivations to write papers in co-authorship

The question aimed to comprehend the current motivations behind the activities of co-authoring texts among the academics at the environment investigated. There were several expected answers from investigations and trials conducted previously. They were:

- Decrease conflicts of interest
- To get it easier
- Expert knowledge interaction
- Improve career records
- Improve institutional ranking
- Improve the visibility of own work
- Access better funding opportunities

The interviewees were not confronted with the above described options. These will be used only in order to confirm or refute assumptions regarding motivations influencing co-authorship also in different contexts and audiences.

It was possible to identify two main distinct interests for co-authoring texts:

– Exchanging ideas and perspectives;
– Dividing the effort of investigation and writing.

Both were mentioned for at least half of the interviewed audience. The “exchange of perspectives” refers to interaction aiming “knowledge complementarity”. What also encompasses the idea of learning “from and with” collaborators, or in other words, “to challenge your own way of thinking” (21st. Interview). Several interviewees refer to research and publishing activities as “the motor” that keeps them updated and motivated to learn further.

“Enriching the content” is another form to express this motivation. It refers to the goal of constructing a better and more balanced argumentation, with clear improvement for analysis' and discussion's quality. The objective of “increasing the intellectual weight of the work” is another form of referring to this interest. It is indirectly related to the increase of the potential visibility of the research output. When an author seeks collaborators with more knowledge in certain topics, or colleagues outside of his own field or specialty (multidisciplinary / interdisciplinary).

Similarly, the “divide effort” interest relates to a set of other justifications that at the end intend to make easier the whole work completion, or to improve the potential of

formal performance assessment (e.g. to borrow professor's prestige). In that regard, professors and students have a symbiotic relationship, or a relation of synergy, where the participation of professors as co-authors on students' papers is perceived as a matter of convenience (e.g. to be co-author in a paper is a way to pay respect and recognition to the effort of a student or a colleague, while seeking to get the points required by the current assessment system).

In general, professors help students gathering some experience within writing and publishing, and students give professors the material they need to attend requirements of institutional assessment (e.g. to teach in the graduate program).

Few professors refer to the motivations for co-authoring papers as an “exchange of favors” (services, experience, data or information), like a credit, that some day may be charged. At this point it is important to mention that some professors refer to judicial disputes regarding the authorship of articles. And many mentioned the need for more clear support and precise norms regarding authorship and co-authorship, since it is usually a personal and spontaneous process.

The researchers interviewed for the present investigation unanimously refer to an ethical flaw of the current publishing culture. According to them there is a “tacit agreement” among researchers, professors and students to take colleagues as co-authors (Characteristics of collaborative writing and publishing – p. 110), even when they write the articles alone (figurative or “side effect” co-authorship – p. 119). They said that in practice the current context of co-authoring texts does not involves real collaboration. It is indeed “very rare”.

They refer to this as a “lack of coherence”, happening due to the mandatory requirement for publishing a minimal number of articles per year. It is considered as a new problem, since the indexes of impact where introduced recently due to the adoption of the digital technology that made this approach to data possible. Therefore, professors declared to have adapted themselves according to the requirements from the institutions they work for, and using characteristics of their current context to attend these demands (e.g. professors must teach classes in parallel with research work. Thus they combine these two activities, being natural to see students as main collaborators for writing papers).

It is reasonable to remember that writing papers is a mandatory requirement for professors. For students it is an important part of their instruction as researchers. This helps to understand the attitudes of some professors that demand to be the first author of the articles they write together with graduate students. And this is happening despite no significant difference between co-authored or single authored texts for the assessment system.

Senior professors demonstrated to have another way of relation to the whole issue. “Personal satisfaction” was the main justification for them to write articles in co-authorship. Since they are not interested in career progression, they declared that co-authoring papers is a demonstration that they are still “useful” at the university, specially while advising students. Senior professors also see this practice as a synergistic relationship.

Finally, there is the “social importance” of research. It is an ideological aspect, very efficient in bringing people together in a jointly effort to produce something. But taking into consideration our current context (cultural, institutional and economic), a mandatory requirement to publish a certain number of articles per year, ends up promoting a bias, where anyone sees as legitimate to put personal or institutional conveniences before the scientific goal. Or to make academics to ignore the social importance of their own work, since they are directed to focus (by the context) on individual interests at first.

The testimony of one professor helps to understand the current situation:

> “...Before this mandatory requirement, I published in order to disseminate the information... nowadays, with this compulsory publishing, I do it firstly in order to attend administrative requirements” (44th. Interview).

Institutional support for collaboration / co-authorship

The question wanted to verify the existence of institutional initiatives or policies regarding the application of tools, methods or systems for academic networking, collaboration and co-authorship of scientific material. It also intended to understand the reasons behind the current situation, and possible alternatives to foster a better scientific collaboration.

There is no specific policy, nor institutional support or offer towards directing or encouraging the application / use of tools for communication matters (scientific advancement, discoveries, collaboration). Professors and students must search,

choose and learn by themselves the tools or services they need for such purposes. In terms of communication policy the university is a “desert” (3rd. and 38th. Interviews). There is a clear impression that communicate effectively is not the priority.

The institutions transfers the responsibility of publication / communication to the authors (researchers / students / professors). Communication is then a matter left entirely to the individual, and on a volunteer basis, to decide how to proceed (Individual autonomy). Therefore, it is a matter of “convenience and inertia” imposed by the context (academics learn what and how to communicate from and with colleagues).

The issue relates to a cultural aspect of public universities in Brazil. The general culture of public servants in Brazil can be summarized as follows:

> “People working at public institutions are prompt to help if they are rewarded” (14th. Interview)

The fact that other institutions offer specialized services (e.g. librarians) that take care of specific tasks (information search and retrieval) with more competence, add up to the argument that researchers may have more time and focus to be dedicated to the scientific inquiry itself.

This absolute lack of institutional policy specifically intending to improve services and procedures like “information management” may be a result of a very inflexible structure. On the other hand, there are offers of tutorial courses for nearly any application available nowadays on the market. Such courses are usually offered by the department of Informatics, or by the corresponding department (e.g. statistics).

Curriculo Lattes (lattes.cnpq.br) presents quantitative analysis of communication and disclosure forms, and statistical characteristics of collaborators networks. And the absence of a clear communication policy gives the impression that the university's administration is satisfied with the current practices. Furthermore, since professors are overwhelmed by the present workload, there is no time left for procedures (communication) improvement, what could change the current situation in that regard.

A relevant issue raised by some interviewees, refers to the possibility to represent knowledge, information and data in many different forms. The university does not determine how they should be communicated (there is no policy, resolution, or norm

regarding the form of communicating research results). The only thing important is to demonstrate quantitatively the work done.

Professors are aware that they are in a transition, regarding communication (analogical – digital). Most of the staff didn't grow up with computers, mobile phones etc. Younger fellows are just started taking positions as professors, and thus bringing an entire new communication culture in to the examined context. But the absence of a policy to conform and guide this transition, specially regarding research and teaching activities (e.g. best practices in communication for scientific purposes), is clearly a weakness. And this is still simply the default of the current academic context.

Most of the interviewees declared that a communication policy would certainly change their habits regarding procedures and tools they apply for academic activities. Although, some academics (e.g. senior professors) demonstrated no interest to learn new tools and procedures.

One testimony summarizes the interrelation among these issues:

> "...the lack of any policy or requirement to improve our communication turns to feed our complacency" (39th. Interview)

The bureaucratic attitude of university's administration empties the possibility of adopting new practices and tools. Platforms like Joomla and Moodle were adopted recently for the management of lectures and seminars (materials and examination). But they do not gathered enough experience to make possible any evaluation of their impacts for academic communication.

Main barriers for collaboration – What is missing?

The question intended to shed light over the most relevant barriers and impediments for the full development of scientific collaboration among the professors of the graduate program in forest engineering at the Federal University of Paraná / Brazil. The ultimate goal was to indicate options and alternatives, specially in terms of institutional policy, in order to promote the improvement of communication among academics, and between them and the layman public.

There were some expected answers, suggested during previous research and trials of the present inquiry. They were:

- Institutional policy
- Cultural change
- Information organization
- Information services / structure at my institute
- Knowledge access and transference
- Content qualification and eligibility
- Financial support
- Technological literacy
- Better software tools
- Lack of awareness for communication issues
- Problems of administrative / institutional structure
- Lack of trust

The interviewees had total freedom to name their own options of barriers and problems for collaborative efforts. I decided to list them according to their significance for the present investigation as follows:

Inflexible and bureaucratic administrative structure

The audience manifested a general view regarding the public university as very slow on mobilizing resources. Furthermore, they declared a public distaste in front of the current quantitative indicators defining the allocation of resources. These indicators result in many discrepancies, specially because they do not consider important factors like the importance of the research output to society. What turns to be a policy of disincentive to the research work.

Another aspect of the administrative structure is related to the fact that research is not priority at public universities in general. Formally, professors are employed to teach on under-graduate courses. Teaching on graduate programs is a volunteer activity (no pecuniary reward). Therefore, there is no structure or directive dedicated exclusively to research. Professors assume the role of researchers because they must, since this is a mandatory requirement of any federal university in Brazil.

The context is usually that research is not enough of a priority, rather than not a priority at all. Given the ranking system for publications, it would seem that Brazilian universities make research an explicit priority. But considering that co-authorship has become a matter of convenience, then the official structure would seem to be encouraging it.

Lack of resources

Most of research in the country is done at public universities. However, public universities in Brazil have no budget for research itself. These resources come from public (agencies) and private (companies) partners. According to some interviewees, this fact, in combination with the inflexible and bureaucratic administration creates an insurmountable barrier to collaboration. It refers also to the very reduced number of qualified publications, what creates a special form of market reserve (restricted public and information) for the academic work produced by the best scientists.

This restriction extends the timeout between submission and publication, amplifying competition for space on the publishing market. The accumulation of papers to be published by few journals also causes a significant delay in the release of information to the public. Furthermore, it is natural to see a lack of resources and professionals dedicated to communication tasks (internal and external).

Usually academics use persons from other areas to take care of fundamental activities regarding communication. Few of the interviewees were acquainted with the communication deficiency of the institution as a whole. For them, the implementation of a policy in that regard would represent a “revolution” (31st. Interview) for the current institutional culture. But, in general these are things located on subconscious or unconscious levels of their thoughts.

Institutional policy

The lack of specific norms and rules towards (real) cooperative work and communication gives the impression that these aspects of academic activity are not important (“It is not the priority”). The majority of interviewees complained about the absence of institutional guidance in regard to communication, attributing to it the stimulus to define priorities according to individual interests, instead of the interests of the scientific field, or of society.

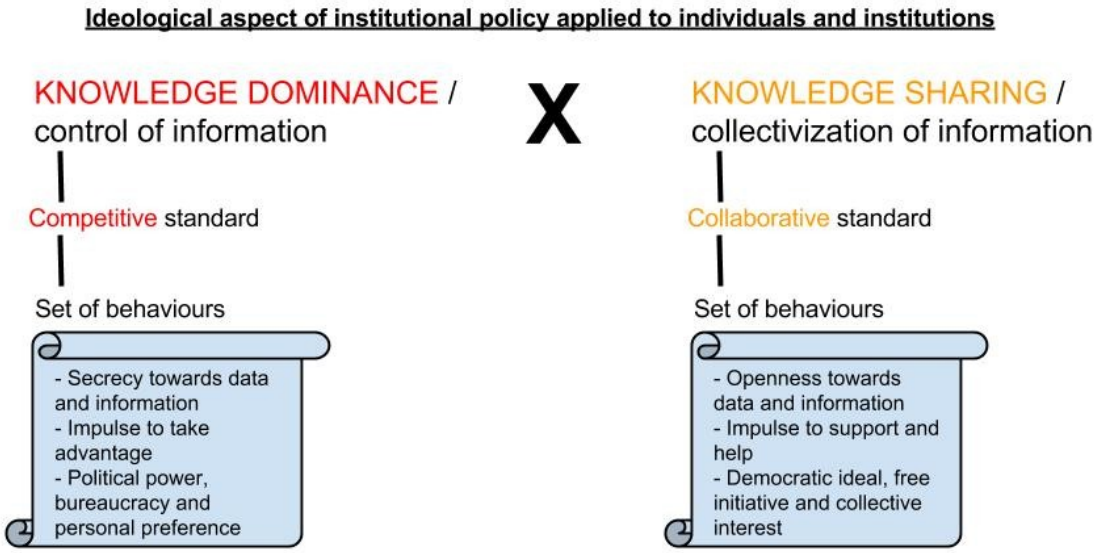
There was an unanimous idea of a missing stimulus (motivation's mechanisms) to work together or to increase dialogue among colleagues of the examined audience. At the same time there is no training regarding work in teams in any phase of a study at the university (under-graduate and graduate). Several mentioned the necessity of

a “spirit” prioritizing “sharing”, instead of “ownership” of the academic work. Or an effort to consolidate colleagues relations as a whole, and not as individuals.

In practice, in order to renew or get funding for research, professors have to submit new proposals every year. This produced an increase in the number of projects and topics, but neglecting the quality of the existing ones, and amplifying the structural fragility of efforts as a whole.

Furthermore, no one is assigned to work within teams, or is rewarded for taking part in any real network, even locally. As a result, individualism naturally rules. This relates to an ideological aspect as well, which encompasses the dispute between two opposed attitudes that apply either to individuals and institutions. They can be better represented graphically as follows:

Figure 8 - Ideological schema for individuals and institutions (Senna da Costa, 2014)



Besides the absence of norms, or rules concerning work within teams, the publishing and academic assessment systems were considered very plastered. Specially considering the possibilities for information distribution via the Internet.

For instance, researchers are not allowed to release publicly the same information they are using in articles submitted to publications that are fundamental to their career progression. The main reason is the required exclusivity of content submitted

for publication in traditional journals. In other words, traditional rules and habits for collaborative academic publishing represent a clear barrier against open access, while advocating the maintenance of an intangible quality standard.

It is a consensus among professors of the graduate program of forest engineering at the UFPR that the current publishing norms inhibit the adoption of better tools and processes, which could help to improve the connection among researchers and the synergy of the efforts. And this includes also the timeout between submission and publication of articles, specially considering the mandatory requirement of exclusivity for the submitted papers.

For the examined audience the most urgent problem is related to the current reward and assessment system of academic work. It is seen as undressed of any kind of compromise to scientific advancement, since only the number of articles published do not represent in fact any parameter regarding the content itself. It is indeed dedicated exclusively to attend the demands of managing the educational institutions, rather than giving conditions to improve the quality of work done by academics.

There is an absolute lack of means to deal (comprehend, evaluate and promote) with quality at academic environments. This is due first that the current system has no connection to the object of research itself. Therefore, it is promoting a “convenient” form of co-authorship, for instance. What is manifested in phenomena called “papermania”, or “chain of citations”. This last one makes impossible to find the primary source of a citation.

Many declared that in practice, if they work better and more efficiently their reward will be only more work. For them the current academic assessment system favors big and well established institutions, impeding or disrupting the development of new perspectives on research. “Merit” today is seen as fundamentally based on quantitative indicators, without any qualitative alternative (34th. Interview).

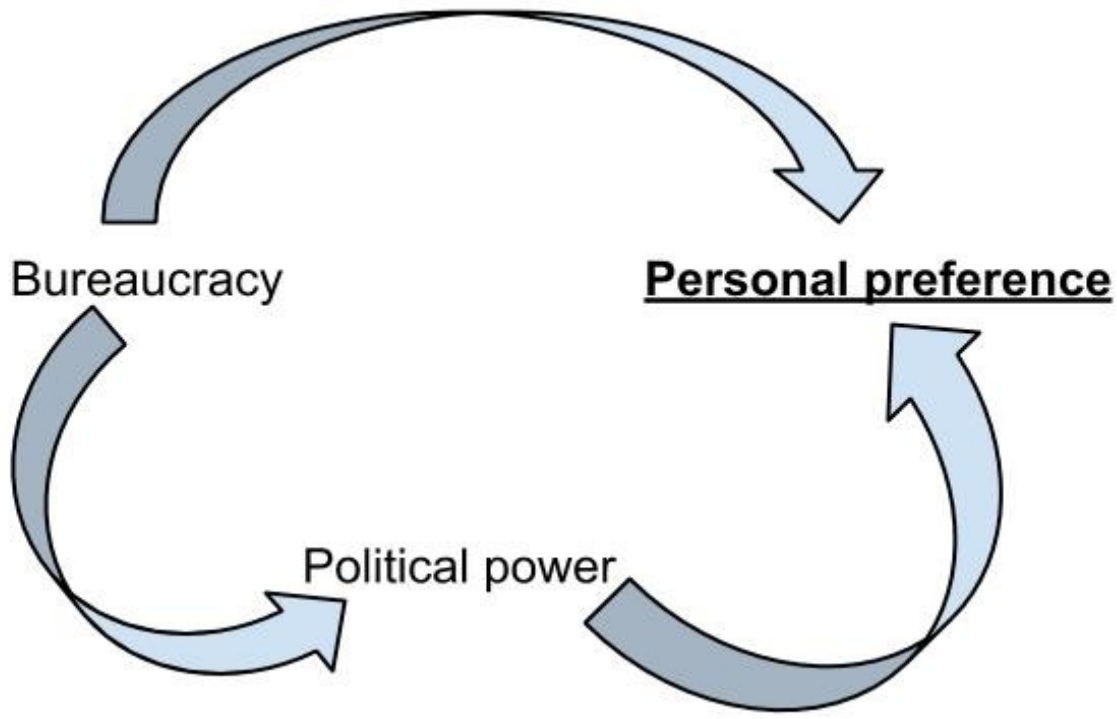
A solution demands initially different assessment criteria for teaching and researching. Regarding the last, a policy should promote the sharing of discoveries aiming to improve science itself, and not only the conditions of the individual work. One practical suggestion given by interviewees is the reclassification of national

publications on the field according to local characteristics of the field and of the current publishing culture.

This refers to the lack of a framework to attend academic research needs respecting the characteristics of the local context, what indicates the necessity of a shift in mentality. This change relates to a transformation of a vicious circle which works as self reinforced mechanism that can be represented as below.

In few words, there is a lack of a culture and of an infra-structure for the coordination of multidisciplinary and poly-institutional works. And the task becomes much more complicated since all academics were still from a transitional generation, regarding the technological revolution brought about by the Internet in the last decades. Furthermore, the current policy for research assessment reinforces an obsession for a competitive edge, and does not try to change this vicious circle. According to professors, it could be done through a policy guideline to counter the current academic culture (22nd. Interview).

Figure 9 - Vicious circle of individualism as self reinforced mechanism (Senna da Costa, 2014).



Individual and contextual inertia

Established tasks (teaching) leave no time for new things (innovation), and this lack of time is also responsible for generating a lack of dialogue and good will for collaboration among colleagues.

New technologies have an “addictive character”. Once you adopt a new tool it diminishes or replaces your ability to work without them. A common outcome of the above is the belief that specially for old fellows it is not worth the effort to learn new tools, and practices. At the end the dispute is about who controls the work and effort. And conventional tools offer a better control of the process regarding the existing norms.

In the present context people are simply taking advantage of the norms of the system, but the system has been unable to evaluate the real relevance of a research work to society. There is a lack of means to assess the importance and applicability of scientific endeavor.

Another aspect of the context is its culture of clusters, where a new comer have to find a place and belong to one cluster, in order to avoid exclusion. Unknown people have difficulties to come closer and take part in projects being developed by existing clusters.

The members of these closed groups (clusters, feuds) only share information among themselves. A protective attitude, where people do not compete directly, but do not cooperate at the same time. This is a common tacit norm ruling at the investigated context. A cultural component promoting distrust among people, a kind of side effect of the inherent competitiveness of a capitalist society.

Furthermore, the interviewees refer to an environment where an individualistic (my discipline, my project, my research, my idea, my funding, my name) and competitive (“every man for himself”) attitude rules, promoting a communication based on internal flattery (“adulatory communication”). And this brings to the result that people with more scientific expertise and competence do not get support and resources, as other people, that are not so good in scientific activities, but that are very competent in promoting their interests.

Such claim corroborates to the concept of “success” among most academics, which is associated to the financial /funding aspect of research work. That controversy

asserting that the institutions and academics with better funding records, are not the most scientifically competent. Or that, the better funded projects may not be the most relevant ones for society. Two interviewees summarized the case:

> "The individualistic context promotes separation and competition, instead of collaboration". (26th. Interview)
>
> "A chief of department is a political position. It creates a context in which the rest of the staff becomes extremely dependent of his good will in order to get things they need to improve their work conditions".(12th. Interview)

The inertial relation can be graphically described as follows:

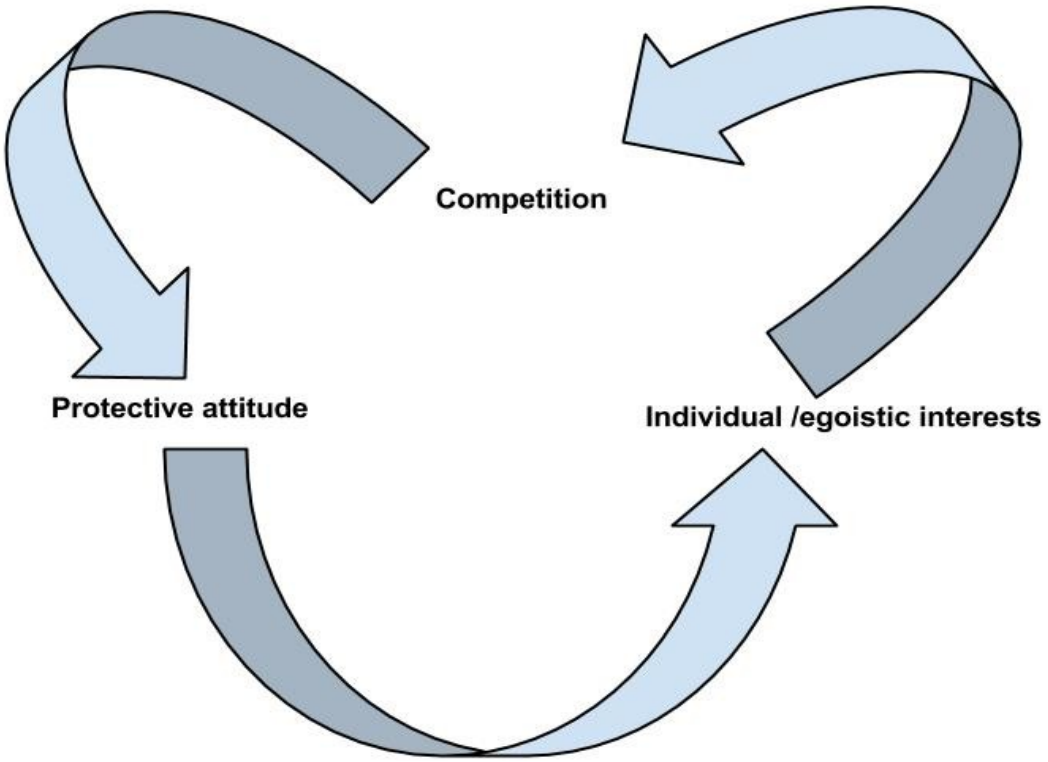


Figure 10 - Individual / egoistic interests promotes competitive and protective attitudes. (Senna da Costa, 2014)

The figure above illustrates how the set of individual / egoistic interests promotes competitive and protective attitudes, instead of collaborative and sharing attitudes, which would better serve the collective / common interests.

In other words, individualism impede the collaboration to happen in a more efficient and productive fashion. Many interviewees declared that such context ends up shaping all relations among colleagues (26th. Interview). It shall work like a shared idea that most academics simply use the university for their private interests. And

this is also a reflex of the institutional policy. One example in that regard is the norm disengaging senior professors of attending departmental meetings.

The selection process of new professors is another example of such institutional bias. It is perceived as a very politically charged process, with personal and administrative interests playing a major role. According to some interviewees the selection of new professors does not focus on continuity of scientific work.

A couple of them declared to see a relation of the context at universities, with the general political context of the country, what is defined as “small world”. Such analogy, helps in explaining the “academicism”, what is also manifested when people try to impress others with quantitative records, or with very complex explanation. According to these interviewees “the role of science should be to demystify expert knowledge, not the opposite” (23rd. And 24th. Interviews).

Freedom and vanity

This relates to the subjective character of the scientist (vanity, pride, jealousy, envy etc). These are feelings promoting the disintegration of the scientific effort (43rd. Interview). As a result, people commonly uses rules and freedom they have in order to promote their own interests. Some refer to it as an attitude of pretending a “divine mandate” to pursue almost exclusively their own interests, what is usually related to their egos. The “rain of egos” is an expression commonly used to refer to the kind of competition happening at academic contexts.

Thus, the problem against collaboration at academic environments seems to be a result of a sum of factors: Infra-structure and resources, lack of incentives to promote collaboration. And also a disconnection between institutional policy and individual interests of academics.

A more complex explanation might consider the cultural aspect. What regards to a lack of a spirit of unity verified in the culture of the entire academic system. In other words, a context with resource scarcity, competition and individualism generates a division of efforts and a mistrust attitude among each other. And the current institutional regulation reinforces this culture. At the same time that the current performance standards are pushing people to publish more, implying working together, they are doing so exclusively through quantitative parameters. The result is

an increasing amount of works published, but with an uncertain degree of quality, which is not directly assessed at all. Most of the interviewees mention an impaired relationship among colleagues due to the influence of competition at public institutions.

The academic culture of freedom can be illustrated as below presented:

Figure 11 - The triangle of current academic culture. (Senna da Costa, 2014)

In general, the professors at the Cifloma have suggested that the greatest bottleneck at academic environments all over the world is cultural ("...a mood towards collaboration..."). It is related to people's attitude. The way scientists are used to act. In some cases they are seduced by the context, in other cases they are obliged by the institution, but they almost never react regarding the form and direction of policies and rules, since it is easier to conform.

Some mentioned the necessity of forms of work organization that inhibit behavior or attempts to harm other colleagues interests for vanity or fear of loosing influence or power. Vanity, pride, jealousy, envy etc, are the kind of feelings promoting the disintegration of the scientific effort, specially considering a context where there are mechanisms like academic rankings, productivity indexes, patents, and other intellectual property means that add a financial or economic interest.

The financial interest represented, for instance, by the current system of patents is perceived as a great barrier to the development of a more collaborative academic effort. According to the examined audience projects involving economic applications or interests are developed under strict secrecy, and managed or guided primarily according monetary reward. This make of collaboration a less important feature, or in

some cases an undesirable practice. On the other hand, few interviewees suggested that humility would function as a great remedy against ego oriented personalities. (44th. and 45th. interviews)

Competition

Among all issues raised, the most intriguing was the related to the aspect of competition at academic environments. It was possible to identify two distinct approaches to it: rewarding and punitive. And they are applied to opposed situations also related to the meaning of competitiveness in science:

- Collaborative competition – Motivational factor to pursue improvement taking the performance of others as comparative parameter. Trust of others.
- Conflictive competition – Motivation to pursue improvement seeking the failure of others as comparative parameter. Distrust of others

One professor regarded the above described situations as follows:

> "Certain people simply get satisfied to see the success of others. But there are those who take the success of others as a demonstration or confirmation of their own failure" (42nd. Interview).

Several said that competitive environments tend to promote isolation, seeking individualization of the benefits of work effort. A few explained that competition in a private company is a good thing, a motivational aspect of work. While in a public university this same spirit of concurrence is counter-productive, and the main reason is that at the university no one should work to achieve any individual goal, since science always advances by collective effort ("academics practically depend on each other to make science to advance").

In that regard, a couple of interviewees called upon an "autophagic process". It refers to the endogenous concurrence (people graduated and post graduated in the same department) turns to reproduce and motivate an "anomalous spirit of concurrence among colleagues" (36th. Interview). According to these interviewees, this is a result from the massification process of academic activities, which inevitably produces standardization. Professor Roberto Hosokawa, the first director of the graduate program, and consultant at CAPES and CNPq for several years put this effect as follows:

> “Ideas are the most important product to any scientist and this is why philosophy is still important to any scientific discipline nowadays. But in which institution is still philosophy important?”

Among the most significant answers, one asserted that the “competitive aspect of scientific work depends on the size of the soul of the scientist” (42nd. Interview). While the majority of the interviewees said that without competition the context leverage the work by the less effort. In other words, it becomes a disincentive.

For the examined audience, the current academic policy promotes competition among public institutions (e.g. Embrapa x UFPR). They dispute projects, funding, scholarships, contributors / collaborators and recognition. The spirit of “save yourself if you can” rules. And there is a perception that in public institutions this spirit is exacerbated.

The interviewees with administrative experience also attributed such competitive exaggeration to the progressive devaluation of the teacher's salary in public universities. Through time and without a clear policy for the adjustment of wages, the real income of professors and workers has fallen. As a consequence, professors are doing consultancy for private companies in order to complement their salaries, using public foundations inside the university (e.g. FUPEF) to intermediate and formalize contracts.

Thus, the system is clearly shaping professors' professional behavior. With professors selling consultancies as scientific research in order to increase their income, and at the same time following the rules of the institution.

The government is encouraging this kind of situation, where the university pays a basic salary for teaching activities, and any complement (e.g. research) must come from outside (e.g. private companies). What can be seen as a form of privatization of the public investment / infra-structure (35th. Interview).

The solution would require a mix of tactics. But one of the decisive would work as a kind of system supporting leadership demanding a change of attitude and behavior.

5.5 Data analysis according to the research questions

> “Ideas are the most important product to any scientist, and this is why philosophy is still important to any science nowadays”.
> (Prof. Roberto T. Hosokawa, first director of the School of Forestry Engineering at the UFPR and the main adviser for graduate students with 38 thesis and dissertations)

Here is a summary of answers to the research questions used to guide the investigation of forest scientists practices when co-authoring and publishing. The main question was: What attitudes, habits, norms and policies verified in the graduate program of forest engineering at the Federal University of Paraná / Brazil (UFPR) discourage the application of online tools, like Google Docs / Drive, for co-authoring purposes?

The answers showed that the barriers for adoption of tools like Google Drive go far beyond the plain “lack of time”, perceived as an unanimous condition in most of data regarding habits and practices of academics. Lack of incentives (funding, policy) appears as the most relevant problem for collaboration, and the main argument points to the absolute lack of specific norms or rules (ranking) towards cooperative work. The data from the interviews concerning this topic can be grouped as follows:

– There is no policy regarding communication among scientists, therefore the academic collaboration happens on a very spontaneous basis. Concerning the publication of texts, for instance, there is a lack of incentives to the adoption of more efficient and transparent methods for producing knowledge;
– The norms regarding collaboration are based only in quantitative performance measurements, therefore do not grasp the nature of collaborative practices and the motivations behind them. A good example is that there is no difference in value between single-authored or co-authored texts;
– Mandatory requirements for a minimal number of published articles per year cause distinct side-effects on the relations among professors and students, including on their choices of publications, motivations to write and on content quality;
– The rules from CAPES (body of the Ministry of Education which regulates graduate programs) induce a competitive attitude of researchers when publishing their texts (official evaluation – rankings);
– Current publishing system poses several barriers to the adoption and usage of new tools and practices. For instance, publication's timeout - authors have to wait at least 6 months to receive any feedback about a submitted paper. Until publication this timeout can take up to 2 years (traditional journals). And they are not allowed to distribute submitted texts through other forms under the threat of compromising the required exclusivity.

From a more qualitative point of view, the most relevant answers given during the present investigation by the most experienced researchers were:

– “The form of evaluation at any academic institution determine the way academics work. The workers follow these determinations. It is not a matter of individual choice, or desire. Academics have no time to search for alternatives themselves. In fact, the alternatives must be given by the institution they work for, since professors declared hardly to have time to keep up dated their page at the Curriculum Lattes, which is a mandatory requirement. It is a very good record when an academic do it twice in a year”. (Prof. Vitor A. Hoeflich, 60, Assistant Coordinator of IUFRO's Work Group - Forest and natural resources policy and governance in Latin America and the Caribbean).

– “Researchers should not care about the grade or evaluation of a journal... their duty is to do good and relevant scientific investigations, and he should never be required to publish in certain, well qualified or ranked publication. If he publishes in his own weblog, this is his decision and he should not be punished neither rewarded for it...the quality of the publication is not a proxy of the quality of research it is publishing... the progress of science must come first the progress of the career.” (Prof. Ricardo Berger, Former chef of the graduate program, and he is still acting as Deputy head of the department of Forestry Engineering at the Cifloma.)

– “Let us take the example of our own publication here on the Cifloma (Revista Floresta). It was until last year a B4 publication. And it became this year a B2, because it was incorporated by certain data-base indexers (SCOPUS, Scielo, ISI). It means, the publication didn't change its quality, or didn't improve its content in any aspect. And the criteria to be indexed by these data-bases has very little to do with its content quality. For example, why we do not have our content in English? Or a minimum number of articles per year. And this for us does not make any sense, since we are in a Portuguese speaker country and quality can not be assessed by the quantity of texts or pages”. (Prof. Nilton José de Sousa)

– “I am critical to any publication ranking being used nowadays. First of all, they do not represent our country's reality. Even if you take a single area, avoiding the comparison among them, you will see that it is structured in a corporate way. The list QUALIS, for instance, in our field (agricultural sciences), you will find there publications with lower quality, in terms of content, but with a better position in the ranking. In my view some of reasons for this bias is that the most ranking systems are based on a calculation system (index) that prioritizes data-bases conglomerates, and this is so because it is done by a private company... it means, it is unavoidable to have there a corporative bias... the magazines on the CAPES data-base, for example, are indexed according to the ISI criteria, which is developed by a big private conglomerate. It is easy to see that if they do a business to it, they would inevitably manipulate their product in order to attend their interests. Other issue, is that we have very few publications with a significant position on rankings. They do not represent the Brazilian scientific diversity, neither disseminates the research output according to the very different geographic regions of the country. These publications have as single function to evaluate,

or attribute a value to the individual productivity of our scientists. Our institutions nowadays work with the idea of "knowledge dominance", and not with the principle of knowledge sharing or collectivization of knowledge... it is a competitive standard... among individuals and institutions. this creates an entire set of behaviours accordingly, including the principle of competition which generates an attitude of secrecy towards data and information... the policy regarding research evaluation in Brazil nowadays reinforces this obsession for a competitive edge, it does not try to change this vicious circle... it is a philosophical matter, but it has a huge impact on how we work and are used to relate to each other. We miss a policy guideline to counter the current academic culture". (Prof. Nivaldo Rizzi, former Dean of research and Post Graduation at the UFPR and manager of research and funding policy of the Paraná State for 5 years).

– "Qualis is a system developed by CAPES to classify the academic journals that are significant for the Brazilian scientific publishing context. It is based on the ISI system (Web of Science) and uses almost exclusively quantitative criteria to create its indexes (impact factor) and rankings... the Qualis does not have any mean to assess the text quality, the merit of the topic, much less the relevance of the information published for the advancement of science... At the end it overstates the importance of the international research over our national research effort, does not matter how good and important it is.... The main criteria for the evaluation of professors and students is the publication of articles in indexed journals. For professors, a second criteria is the number of students under advisement... Therefore, what is important to CAPES is that professors and students are publishing together, does not matter what and with which quality... the number of publications speaks for itself... For professors the main criteria is the "intellectual production" (40%), and in the Forestry certain characteristics of the field justify its own criteria. For instance, conferences and congresses are not considered exactly because, for the characteristics of the field, very close to industries and others direct economic interests, it means that if it would count anything we would experience a great amount of research initialized but never finished, just in order to present few results in conferences... on the other hand, for students the conferences are counted... it is different in Informatics, where congresses count for students and professors... usually everyone tries to justify their own interests... The problem today is related to the egocentrism as the core philosophy at the academic environment. "I am.....! I have...! I win...!" It is a lack of humility, which makes us to amplify our ignorance. We have lost our capacity to relate to each other in order to learn, like the children do". (Profa. Graciela Muniz, 58, Coordinator of Research and Development of Science and Technology of the UFPR).

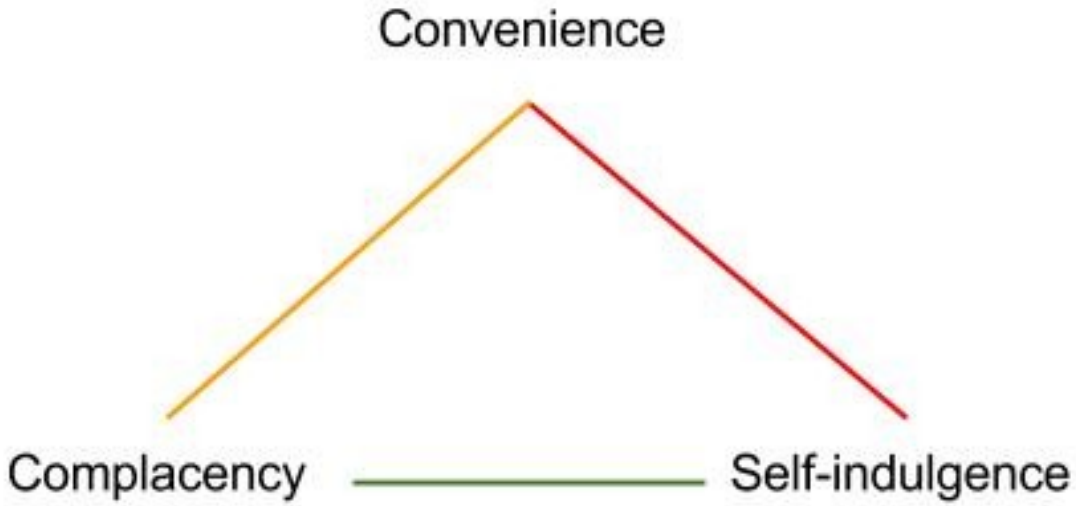
– "There are two pernicious factors: 1) the obsession to publish anything in papers, because it is decisive to career progression; and 2) the situation of misery of the researcher, which means the lack of financial support to scientific investigation in general. Regarding the second factor, it operates nowadays basically through scholarships given by CNPq. Which is a very low (400 Dollars per month) resource that ties the researcher to an inadequate assessment system... which for instance, **does not give any reward to an academic who reviews articles to be published in a journal.**.. We lack a

communication policy intending to improve the dissemination of scientific information...”(Prof. Dimas Agostinho da Silva, head of the department of Forest Engineering)

Four derivative questions intended to support the scrutiny comprised in the main question. The results to the first derivative question (How does the target group usually apply online tools for academic communication / collaboration / co-authorship?) can be summarized as following:

– Habit and inertia rule the current procedures and choice of options (tools, publications, services). They choose the tools according to their convenience. What is easier, what is at hand, what is commonly used at their environment. Complacency is a common aspect, as well.
– The lack of support and incentives for improving academic communication creates an inertia regarding habits and procedures for publishing. (“tudo fica a critério de cada um”).
– Furthermore, the current system of author's / publication's / university's ranking produces a devaluation of the importance of congresses and conferences for the communication framework of research on the field. And this is incoherent with the current reality of the research work in forestry. According to most of the interviewees, such policy is emptying their interest for discovery and innovation.
– In some cases the trigger of such an attitude is plain lack of time. In others, it could be a result of lack of appropriate policies. But it is undoubtedly a symptom that our institutional culture based on productivity and competition is doomed.
– Ranking focused almost entirely on individual productivity masks the importance of research projects to the local where it occurs.
– Professors usually ask: “Why should I change? What would be my benefit in doing so?”
– At the end, web communication is mostly used for bureaucratic and formal functions. And the way university's administration manages communication issues (as individual matter) discourages new approaches and solutions.
– Most of the interviewees declared that a communication policy would for sure change their habits regarding procedures and tools they apply for academic activities.

The factors (Fig. 7) influencing the decision process regarding publications, for instance, can be represented by the schema bellow (Senna da Costa, 2014).



There, convenience, complacency and self-indulgence operate interdependently. One opens the way to the others, while shaping and conditioning the choice of tools and practices. And this becomes a shared attitude that discourage the application of more efficient and better communication tools and practices.

The answers of the second derivative question (What are the main motivations of these academics in writing an article collectively? Do they perceive any clear advantage (individual, institutional and/or social) in co-authored publication?) can be grouped as follows:

– Co-authorship is still a complicated matter. Co-authors usually add little support to the writing effort. Not rare they simply lend the name to the article in exchange of some benefit, that in many cases has nothing to do with the matter of the article itself.
– The main advantage is based on mutual convenience. All professors are co-authors of their students. A solid majority only write papers with students.
– Most professors do not have time to conduct any research by themselves. Which implies an element of convenience again. Students bring the state of art on tools and data available to professors. And they write articles collectively in order to have less work attending to mandatory requirements of a certain number of articles produced each year. Weirdly enough, there is no perceivable advantage on co-authored, nor single-authored articles to their career.
– The main influential factors for choosing the type of publication are: Individual interests (Goals) and Characteristics of the work (Goals).
– It is clear that “ego” and “subjectivity” are important components influencing the decision making process of scientists, which is also defining

and shaping their behavior. The scientific culture is known as characterized by a high level of competition, what combined with vanity and individualism, creates an atmosphere where mistrust reigns. One professor declared: “Normally people want to use what you know, what you can doo, but they are not interested in a truly knowledge sharing process.” (31st. Interview)

– As a result, system of rankings is exacerbating the occurrence of a “papermania” or “index game”, and of many kinds of biases on the examined academic publishing culture (e.g. convenient co-authorship). The current form of evaluation of academic work generates an increasingly amount of material published without relevant content. According to one interviewee: “Such system praises people without any talent or interest in working for the progress of science, or for the general well being” (24th. Interview)

– Publishing is currently perceived as the show case of professor's work. A contradiction is however the lack of recognition and incentives for other forms of communication, rather than the exclusive publication in journals and specialized magazines (e.g. congresses, contributions to books and other layman publications).

– The historical rise of joint authorship of scientific papers represents a trend towards sharing and collaboration of scientific information (Price 1963). However, as higher technical education reinforces traditional patterns of individual competition among students, skills conducive to effective participation in team-oriented contemporary technical work may go undeveloped.

– “I was member of CNPq for many years, I was consultant at Capes for 13 years... and I followed the development of the graduate program from its very beginning... while we were doing our masters and doctors courses outside here, including many countries, we managed to keep a diversity of ideas in a cooperative manner, since the professors were formed in many different places, with different perspectives and focuses, therefore little reasons for competing... but when we started to offer the graduate courses here, it started an autophagy process... with students with the same curriculum and formation disputing spaces and positions among each other... It means that students were attracted to pursue under-graduation, graduation and post-graduation in a single environment, which turns to reproduce and motivate competition among colleagues... this was the biggest mistake we did... The spirit of concurrence is anomalous nowadays... the endogenous concurrence (people graduate and post graduate in the same department) is producing an autophagic effect... we must promote a degree of dependency among researchers, to a certain extent that academics understand that they practically depend on each other to make science to advance... also the standardization is a problem... and this is an effect of massification, which inevitably produces standardization, and this conduces to a endogenous process, which ends up in autophagy”. (Prof. Roberto T. Hosokawa, first director of the School of Forestry Engineering at the UFPR and the main adviser for graduate students with 38 thesis and dissertations)

Convenience appears once more as a key factor. The interviewees remarked that they basically advise students with their thesis and dissertations. One of them is the

editor of one of the most important academic publications on the field, the "Revista Floresta", the journal published by the Fupef at the Cifloma. To my interpretation this condition might conduct to a biased situation regarding the analysis and selection of articles to the publication in the mentioned journal.

Furthermore, as the interviewed researchers unanimously referred to an ethical flaw of the current publishing culture, referring to a “tacit agreement” among them to take advantage of the so called “side effect” co-authorship (p. 119), real collaboration on research and publishing is indeed “very rare”.

The derivative question “Are there institutional norms and policies at the mentioned academic environment promoting the application of online tools, like Google Docs, for co-authoring purposes?” received the most unanimous answer from the interviewees. It was as an obvious and tacit situation, although quite absurd. The researched academic environment does not provide any kind of norm promoting the use of technology for the improvement of current publishing and authoring practices.

Despite the advantages offered by recent technologies, authors conclude that there is, currently, "no attraction" to this new possibilities of work to a faculty member. And this is specially due to a set of "disruptive policies" yet in use at public academic institutions. The answers can be summarized in one testimony:

> – “Some requirements of the department publishing's norms, for instance format of the text, graphic disposition and indexation aren't offered by most of the bibliographic tools. Since the requirements go into the most insignificant details (e.g. subtitle must have the first letter in capital and bold). This results that the authors prefer to work with more conventional tools (e.g. Word editor) because there they are more familiar with the features available and also they have a better control of the process. It means, that people, specially the older ones, are afraid that once they get used to apply automated tools for bibliographic management, they won't be able to work without them afterwords. They make us addicted. I prefer to do the layout of my articles manually, because in this way I have a better control of the process and I can my self correct any mistake that appears”. (Prof. Alexandre Tetto)

Finally, the last derivative question (How do they relate to topics like information secrecy / privacy, content accessibility, administration transparency, credibility?) rendered results that can be summarized as following:

> “To publish information about an ongoing research has two sides: a risk and a opportunity. The risk is related to the threat that someone may take and use your information / data as

> it was his own material. The opportunity regards the possibility that through it some potential partner may find you.” (Marisa, 1st. Interview)

The majority of academics here questioned demonstrated a dubious relation to the topics from this question. Concerning content accessibility (openness), for instance, they regard it as a risk (e.g.: data theft) and an opportunity (e.g.: find partners). Only one declared to publish on going research publicly, but the reason for the eventual lack of an open attitude, is rather a “standard procedure” than an effect of a “fear of plagiarism” (p. 111 - 112).

Similarly, most interviewees demonstrated awareness about the limits of quantitative methods to assess academic performance, which is related to the idea of credibility and quality of scientific work. However, they are still focusing at first in the number of articles and the respective indexes they must present in order to attend the bureaucratic requirement of governmental agencies responsible for regulating and funding graduate education. This ends up creating a context in which credibility and quality may be flexibilized to conform interests and values of authors (p.121).

The main assumption examined in the present work is the one regarding the importance of traditional printed publications to the academic career. According to Nentwich (2003), they may still playing an important role. In fact, the issue here relates much more to the institutional rules and procedures, instead of motivations and advantages of online publication of scientific material in comparison to the traditional publication on press-printed journals, usually the most traditional vehicles for most of the academic disciplines. Here I reveal a micro-universe at a big academic institution, with the ultimate goal of explaining few social-macrophenomena verified in scientific contexts.

6. Conclusion

> "Technologies may not be sufficient to bring about major changes in scholarly communication forms. Efforts need to be made to identify what factors promote or inhibit using the Internet in scholarly communication so that we can have a strategic plan for such a transition". (Zhang 1998, 249, in Nentwich 2003, p.37)

This work consists of a socio-anthropological investigation of forest scientists in Brazil, with a focus on their tools, norms and practices for publishing using co-authorship. Quantitatively it explores data on the tools that are used, the frequency of publishing activities, the collaborative characteristics of communication processes, and perceptions of technological, institutional and cultural aspects involved in academic communication, and in particular , in regard to publishing and dissemination activities. Qualitatively, it sheds light on reasons behind the phenomenon of academic co-authorship, by exploring the institutional framework and context among staff members in the Program of Forest Engineering at the Federal University of Paraná, Curitiba - Brazil.

Forty six (46) professor-researchers answered a questionnaire that included twelve quantitative and six qualitative questions. Most of these respondents hold Masters, Doctorate or Post-Doc degrees from universities outside Brazil, from countries including: Argentina, Australia, Canada, Costa Rica, Finland, France, Germany, Japan, Spain and the United States. The majority (65%) work at the UFPR in a DE (Exclusive Dedication) regime, which means that they are not allowed to work (even part-time) at any other institution. However, many of them are constantly involved in consultancy projects (through partnerships between the University and other institutions) in other countries in Latin America (including in Argentina, Uruguay, Cuba, and Guatemala), Asia (Vietnam and, Indonesia), and Africa (Angola, and Mozambique).

Six of the respondents were retired, but still work as “Senior Professors”, advising students and helping with projects. They have also held leading administrative positions in the school of forest engineering at the UFPR. A few of the respondents are even alumina from the very School of Forests where they work today as professors.

Almost all interviews were conducted in face-to-face meetings. Only one interview was completed using Skype, which in terms of ethnographic research still provides high quality and reliable data.

With the intention of avoiding the bias of a “positivist image of science” (Forsythe, 1999 - p. 137), the research analysis used a critical perspective on certain practices, including those of my own. It rendered several suggestions for improvements on social research and personal interview technics that my experience as a professional journalist and publisher corroborates as feasible.

The results confirm that the potential for further developments in communication processes among scientists is a matter of the cultural and institutional settings in which they are positioned, rather than their technological literacy. The findings, through the use of quantitative data, point to core issues in the evaluation of human communication, and the analysis of the complex relations surrounding academic publishing activities.

The research aims to follow and expand my previous investigation into communication practices in Forestry and Agriculture Sciences, in which a survey conducted at the ZALF in Muncheberg, Germany (Senna da Costa, 2006) found that almost 90% of its scientific staff were not using online collaborative tools for research communication. Although people declared their willingness to share knowledge through digital platforms, in reality, the absence of a “sharing culture” corresponded with several other excuses, including problems in administrative structures, a lack of awareness of communication issues, and a lack of time.

Some insights from the present research indicate that the roots of these problems are related to human nature. Although one common characteristics of humans is the willingness to cooperate, it is at the same time a feature fully dependent on the context. Pedagogical and psychological experiments have demonstrate that the cooperative impulse of persons can be easily turned into murderous competition within very short time spam (Terkessidis, 2015).

Our inaction and impotence in face of major problems (such as climate change, increasing pollution and political instability) is an indication that we have an urgent need to adopt principles of a more humanist form of science and education in a way that goes beyond acting as a private enterprise with practical purposes. Among the

most important attributes of this type of education is abstract thinking related to the role of academics and the impacts of our current activities. Instead of seeking improvement to the current state of affairs, we look at the problems ahead, such as the side effects from the application of technical solutions (Bateson, 2000).

In Western civilization, materialistic ideology has its own political impacts. The courses given at graduate programs of universities are an example, as they are commonly oriented by pragmatic logic in which it is natural to see the adoption of courses or disciplines because they might be useful to people, or because they result in larger budget, resources or status. This is an effect of so called “information industries” and their “vested interests” (Innis, 1951 – p. 83 and 129), and it exemplifies the application of competitive standards in order to foster private progress.

Epistemologically, this could be viewed as an unsolvable paradox. In most cases, the best demonstration of “usefulness” can only be demonstrated by the use of superficial quantitative means. One of the practical effects of such a paradox is the split of the modern university into a myriad of departments and institutes struggling among themselves to secure funding and investments; the unity contained in the word “university” has become merely figurative. In a similar vein, the utility of academic work has been reduced to helping the country (i.e. the state) in economic or political matters, consequently reinforcing the power structures already in place.

I use this example to approach the roots of the communication bias in science, which is one of the deepest contradictions of our society. Since the economy is the predominant aspect expressing our interconnectedness as humans, it is naturally in accordance with our current ideas of collaboration. Within this realm, it is clear that the main mechanism at work is directed towards self-benefit. This can also be translated into Egoism or Individualism, which is collectively manifested in the “fever of the free market”. This is related to our current motivational ideology: pleading for more, more, and more, in a kind of obsessive culture, which at the same time impedes us to see such a bias (Laitman, 2009).

As a counter strategy, the adoption of a new set of social norms could be a counter weight to the overwhelming pressure of the current economic system to increase competition. It is based on norms around information and socialization, as follows:

– Camaraderie and sharing atmosphere;
– Interdependency as core value;
– Peer-tutoring;
– Strengthened social recognition;
– A system of no punishment;
– Collective grades instead of individual ones aiming to boost teamwork.

Understanding Quality in Context

> "... Keynes was to conclude "we carried the individualism of our individuals too far"... Economists (the Physiocrats) 'believed in the future progress of society towards a state of happiness through the increase of opulence which would itself depend on the growth of justice and 'liberty'; and they insisted on the importance of the increase and diffusion of knowledge'. The monopoly of knowledge which emerged with technological advances in the printing industry and insistence on freedom of the press checked this development...
>
> ...What we are seeing is clearly a decay on human values caused by a so called “quantitative pressure” exercised by current knowledge structures” (Harold Innis, The Bias of Communication - p. 80 and p. 191)

Due to the highly complex nature of concepts like quality or context, it is comprehensive to see an absolute lack of focus on the quality of scholarly activities in most of the research in Information Science. In such cases, the qualitative investigation of activities dedicated to produce information and knowledge are still of great interest.

In 1968, Decio Pignatari (Informacao, Linguagem, Comunicacao – Editora Perspectiva), one of the pioneers of Information Science in Brazil, predicted that new communication technology, which he associated with “excess” or “saturation”, would promote the renewal of interest in books. This notion is corroborated by the evidences collected by the present investigation, where several interviewees declared their preference for books as sources for the best specialized literature.

According to Pignatari, in such saturated context, what a researcher needs is “selective experimentation” - the capability to select and discard information. Necessarily quantity became synonymous with quality and the massive increase of participants transformed the very form of participation itself. This is supported by the findings showing resistance to new, better tools for searching, managing and distributing information.

To find benefits to human values in new communication technologies is the most important ethical challenge of the current generation. We live in a society where electricity and cars are still status symbols and the toys of the rich. Instead of longer

periods of formal educational instruction for more and more people, we should teach people to think by themselves in order to solve real problems like climate change, which is already creating a new set of values and needs (Maniates, 2003).

In certain contexts, agreements among persons are spoken rather than written. On the other hand, some situations are not defined according to agreements, but follow tacit rules or procedures. For example, an outsider usually has no immediate understanding of the same information held by an insider of a particular institutional context.

Remaining doubts also leaves the possibility that the application of even more sophisticated tools turn scholars into slaves of machine logic. In that regard, most traditional arguments do not explore the impact of ideology on the structures and practices of research.

Among the practical impacts, there is the shift of focus in scientific articles, which is indeed related to a change in the meaning of the term “author”. In the current context of knowledge commoditization, the very role of an author has been made flexible in order to attend to the structures of the scientific establishment. The same could be said about “quality”. If originality was once the main criterion of research, it has been replaced by a focus on indexation, undermining traditional scientific capital, and promoting the restructuring of the scientific power through an international publishing system (Beigel, 2014 - p. 759). According to Richard Levins (2010), the social contradictions of our academic institutions are rooted in two main characteristics:

- Institutional organization of the knowledge industry;
- Intellectual biases and constraints of our socioeconomic model.

These characteristics are expressed through the rules regarding recognition, academic promotion, research funding etc, and are evident in the core structures of scholarly life, such as: limits and standards of assessment, rigid hierarchies, and until definitions of the domains of journals. All privileges follow a logic based on the interest of the individual and of the owners of content, reinforcing the fragmentation of disciplines. Treating science like a product for sale, it further promotes competitiveness that intends to satisfy the needs of corporations, which can provide an end of employment.

It is taken as willful practice, which ends up defining the infrastructure available, as well as the goals and directions chosen by educational institutions when defining their curriculum, work flow and investments; Richard Levins (2010) refers to it, an “obvious and deliberate blindness of the organs of 'progress'”.

What is important for the present work is that according several authors, science is not likely to be collaborative as it was thought to be. In fact, we may see that certain processes and conventions are in contradiction with science's traditional objectives and philosophy (Innis, 1951; Kuhn, 1962; Foucault, 1969; Piaget, 1971; Feyerabend, 1975; Santos, 1989; Postman, 1992). Some ideas and theories recognize collaboration as a natural feature of scientists' work. “Contemporary scientific and technological activity is increasingly pursued on a collaborative or team basis”, says McGinn (1991, p.44). However, Robert McGinn, in his book, “Science, Technology and Society”, also admits that higher technical education reinforces traditional patterns of individualist competition. This phenomenon can be referred to as “basic philosophical incompatibility” of the academic establishment (Boff, 2007).

Consequently, it is possible to clearly identify two opposing attitudes towards individual behavior; to institutional policies and to communication technology that exists in scientific environments. According to their characteristics, these behaviors, policies and technologies may be rated along a scale, with either extremes being “individualistic/egoistic” and “altruistic/collectivist” (Raymond, 2001; Maniates, 2003; Laszlo, 2004; Jackson, 2009; Laitman, 2009; Magdoff & Foster, 2010; Azzi, 2013).

The data from this research shows how a set of institutional norms reinforces a general set of attitudes. In the race for funding, for instance, professors and institutes are encouraged to multiply the number of their projects and topics, neglecting the quality of the existing ones, and amplifying the structural fragility of their efforts as a whole. Furthermore, the absence of mechanisms to value work within teams, produces a chain of effects represented by the Figure 8 on page 137.

The answers about the role of competition support the mentioned schema. In a private company, competition is perceived as a good motivational aspect of work; however, in public universities, the same spirit of concurrence is said to be counter-productive. Almost all interviewees recognized the existence of an “anomalous spirit of concurrence among colleagues” (36th. Interview), while also agreed that a lack of

competition cab be a disincentive. Three interviewees related to this as an “autophagic process”, relating the absence of counter strategies to limit the spirit of concurrence, which then produces an attitude that harms the collective spirit imbued at public universities.

All interviewees with administrative experience also attributed unclear policies regarding wages as a progressive devaluation of real income of public universities' professors and workers. As a consequence, consultancy work for private companies is complementing professors' salaries, and thus is another factor that contributes to the spirit of competition. Some of the interviewees refer to such practices as “a form of privatization of the public investment / infra-structure” (35th. Interview).

The solution would require a kind of system that supports leadership, and demands a change of attitude and behavior. A more concrete solution suggests that professors should be evaluated by their pedagogic skills (for example, writing didactic books – 36th.Interview), while assessment of researchers should focus on their investigative practices.

Possible solutions

> “The most costly resources of collaboration are not money, but time and energy, neither of which can be induced” (Thomson et. Al, 2006 – p. 28)

The description of the structure of human relations has been a challenge for scientists from all areas of knowledge for ages. Nentwich (2003, fig.4), for instance, separated and classified scholarly activities (knowledge production, communication, distribution of knowledge and institutional settings) in order to facilitate the scrutiny of factors that influence the adoption of new tools and processes. Another example was given by Thomson et.al. (2006), who described the “multidimensional nature of collaboration” (p. 23).

However, beyond the difficulties of identifying and separating activities, there are also major transformations happening in academic contexts specifically due to the emergence of the Internet as main communication media. Among important challenges are:

- Publishing tradition => Digital culture
- Copyright => Copyleft
- Competition => Collaboration
- Business contracts => Social contracts

Michael Nentwich (2003) argued that the speed of these transformations has made any long-term assessment of impacts “unreliable” (p. 48). At the same time, he highlighted the impacts on the substance of research (including methodology, work modes and representation) as potentially the most significant changes.

These aspects are part of a paradigm shift, challenging core values and traditional structures of society, and there within, the academic establishment. The Open Access Movement, which originated as an ideological approach to scientific activities, is perhaps the most notable result of such a shift. If we are to support the main characteristics of scientific research in the era of digital media (including its distribution, and being interdisciplinary and multi-institutional), it is fundamental to search for new forms to deal with old problems.

This refers to the political-cultural or institutional frameworks in which science commonly operates. Researchers may believe that science at public institutions, as the fruit of taxpayer money, must have an open and public approach to its results and applications. However, in practice, such a standard, if truly applied, would represent a major shift in paradigm. Nowadays it is common to see research primarily tied to the individual interests of the researcher, and this is reinforced by the norms and policies regarding access to research literature, research tools, research data, and to infrastructure.

In other words, the opinion that scientific activities should be open is truly a subversive one in the face of the current institutional model of science, marked by an ideology increasingly based on competition. It seems that a mix between habits and the traditional ideology around publishing is impeding the development of an Open Access culture within science (Mittler, 2007).

A new, ideal approach would be less egoistic, and more altruistic; it would be an open and common way for teachers and students to relate to each other. Inspired by Bateson's (2000) theory of the Ecology of Mind, a few principles of this way forward might be:

- as physical boarders of a country are arbitrary and artificially created, so are the social boarders between people;
- human interaction is a changing and mutable feature of the social system;
- communication / social connection is a fundamental activity / element for social networks;

– economic, social and political dynamics must be managed in order to reduce unfair differentiation.

The adoption of a new set of concepts around academic interactions would be a first step in avoiding the so-called “tragedy of the commons”. With the assumption that selfishness is a fundamental characteristic of humans, institutional norms could play a decisive role in avoiding the prevalence of the “immutable logic of self-interest”. Institutionalized support could make this shift happen (Maniates, 2003 - p. 93).

This discussion is focused on contextual change. It requires the transformation of socialization processes in academic life, including crucial features, like the validation of scientific knowledge, which is related to reputation, precedence and acknowledgement. It requires new social practices, including a different attitude towards data, results, communication and outreach. Indeed, it represents a new pattern of work, surmounting current constraints, like those found in the legal protection of intellectual property.

It is well known that legal forms of ensuring returns on investments into academic publishing, in many cases, conflict directly with the principle of free access to human knowledge (Grand et al., 2010). Furthermore, it is recognizable that there is an “inherent tension between self-interests and collective interests” (Thomson et al. 2006 – p. 26).

This “inherent tension” also relates to the academic rewards system, based exclusively on quantifiable measurements, and leaving aside other concepts, like quality, scientific value and social relevance. It is clear that such a system is promoting the so-called career and publishing “gaming”, which is amplified by the policies of funding agencies towards research output.

For the target group of the present investigation, the sudden introduction of competitive assessments of professors and institutions caused a distortion to the roles of graduate programs, for both professors and students. One of the most relevant critiques is that CAPES compares technical courses, disciplines and areas with non-technical courses that also compose the graduate program in Forestry. For instance, economics' lectures are evaluated in the same manner as those in Engineering. There is no consideration of the many differences regarding the different structures of these bodies of knowledge, the culture of each field or the

academic timing. In the graduate program of Forestry there were five areas, each one of them with different dynamics (2nd. Interview).

The fact is, exclusively quantified measurement of academic performance leads to an absence of guidance regarding the kind of science that is being made. The data collected from the interviewees showed that the framework guiding their decisions concerning paper writing center around the number of papers they can produce, and the index of publications. Thus, it is undisputed that journals are still indispensable, at least for the mainstream establishment of scientific education and research.

For science itself, there are serious doubts about the contribution of journals. Evidence shows that the exclusive use of quantitative techniques to assess scientific work results in the dismissal of many important qualitative arguments and critiques of certain practices (Fanelli, 2010 / Czellar & Lanarès, 2013).

A similar idea applies to the difficulties within interdisciplinary research and publishing, which is a key priority and new demand in scientific investigation. Why is interdisciplinary cooperation so difficult? Because of its nature and structure, it challenges the current framework of disciplines. Since it requires different criteria for basic things, like quality, it is often treated as an undesired or weak alternative to studies within a singular discipline. As the famous anthropologist Margaret Mead asserted, old fellows feel threatened when someone says that the way they define quality, or the way they see life, is not the only way that exists. (Schneider, 2009).

Another aspect is the fact that national universities and labs are remarkably elitist institutions. In there, most of the people are what Mead defined as "digital thinkers" (p. 64), or those scientists who only operate on the basis of methods. This is another reason for resisting interdisciplinary work.

In a similar form, characteristics of each discipline also define the shape of the communicative processes. For instance, there are different extents to which politics engage and influence research (e.g. military research), or the way scientists relate to the ownership of information (e.g. commercial interests). In both cases there is a direct relationship between the degree of competitiveness and the way publishing or collaborative practices are implemented.

The results of the present work confirm what recent studies already indicated: we need to work towards an integrated and interdisciplinary framework, combining, for

instance, the use of bibliometrics with a qualitative (“collaborative”) approach to assessment of academic activities. This promises to make quantitative methods more effective by using them alongside other direct forms of interaction, and allowing contextualization for “the current glut of information”. They testify to the need for human mediation and participation in digital communication. The idea refers a very old discussion around the tripod of: **research** -> **analysis** -> **info services,** and the possibility of distorting them through the application of technology (Oldman, Doerr, & Gradmann, 2014 – p. 13 – 15).

The debate targets a so-called “systemic or contextual bias”. One of the discussions is about the social importance of scientific work. Who is reaping the benefits of research? Different from what may be expected, research projects rarely discuss the kind of progress it produces, or the philosophy it promotes.

In that regard, science has developed similar ideological biases as those found in political, economic and social relations, which reamain invisible and blur regarding the "pure" objectives of scientific research. Thus, historically "science" has been issued similar criticism addressed to economic, and political structures. Among these, I will discuss the lack of transparency.

Academic Co-Authorship, Collaboration and Publishing Culture

> "We are perhaps too much a part of the civilization which followed the spread of the printing industry to be able to detect its characteristics. Education in the words of Laski became the art of teaching men to be deceived by the printed word". (The Bias of Communication, Harold A. Innis, 1951 – p. 139)

Communication is a social phenomenon and function that implies associations to an organization or organism. Communication thus involves the sharing of elements, perspectives and behaviors, through the existence and application of a set of standards. The current state of communication technology, with great advancements as well as the increase in quantity and reach of technological devices, introduces a new notion of quality. This notion is attached to a belief of consumption without limits, and the frenetic production of goods with a short life span (i.e. planned obsolescence). Regarding intellectual production, it is natural to see a trend towards the increase of redundancy in the published works. The degree of repeated research or ideas either raises or lowers the ratings from audience of these works (Pignatari, 1968 – p. 85 – 90).

It is important to mention a tacit agreement taking place in almost every academic environment. It relates first to the belief that science advances through the publication of papers and books, thus justifying the measurement of researchers' productivity by the number of texts they publish in well ranked journals (Kyvik, 2010).

For the present investigation, this premise helps to understand an institutional dimension that influences or shapes behavior. Assessment of productivity solely based on publication ignores almost all other processes of communication that take place before, during and after the publication. More importantly, it conflicts with the fact that discovery or insight often firstly happens in the laboratory, or even in an informal conversation among colleagues.

During this research, Profa. Dra. Graciella Muniz, Coordinator of Research, Science and Technology Developement at the Federal University of Paraná State (UFPR), testified: “The current university is being incorporated by economic imperatives. It is heading towards the “university company”, with the assessment done according to the number of patents generated, jobs created, or how much money is worth a research work “.

The present work takes this claim of a “competitive” standard as a characteristic opposed to a “collaborative” standard. But considering scientific collaboration a social phenomenon, the research characteristic or quality depends on the context, which here, is analyzed according to three interdependent dimensions:

- Cultural
- Institutional
- Technological

The conclusion of the present work shows clearly that both in the examined local context and in the international arena, a “competitive” characteristic / quality dominates as the dominant ideological element. Furthermore, it demonstrates that if affects a certain set of attitudes, perceived here as the root of a contradiction.

The emphasis on evaluation requires the transformation of scientific production into numbers, which is not impossible, but in many cases a mistaken and biased extrapolation. This helps to understand the paradox also verified in the present investigation, in which researchers declare science to be their civic duty, but still considering indexes and publishing a fundamental feature of their work.

Furthermore, it argues that scientific activities develop their own lives through institutional structures, with institutional progress becoming a synonym of scientific progress itself.

In areas such as Forestry, collaborative exchange seems to follow a more bureaucratic and comfortable pattern, in which the publication of an article serves merely as another basis for the academic ranking. Despite their focus on publishing their texts almost exclusively in print-based publications that carry higher impact factors, the scientists at the CIFLOMA declared to be aware that these publications also make digital copies of the articles that are available at libraries, institutional portals and other sites on the Internet.

Therefore, the online publication of the work of these scientists is due to the publication in print-based journals. The findings show that at the ende, this becomes another reason for focusing publishing efforts on traditional print-based journals. Another, anticipated reason for this is the competitive standard of assessment for promotion and tenure, based in the number of published papers (CAPES, 2004).

For the present research, the increase in co-authorship is mainly due to the pressure to document work results in the form of papers. The competition for funding and rewards transformed the number of articles published in an important parameter of success, which naturally increased the social importance of being a co-author in a scientific journal.

According to Kyvik (2010), there are four problems regarding this premise:

- Variation in the density of information
- English-language bias
- How much credit should be attributed to each co-author
- Publication patterns between fields

Besides these, we must consider that social phenomena are not easily or directly described by data, as well as the fact that data is not always easily obtained. The "kind of knowledge" is another unexplored factor in this discussion. This relates to "negative results" on research findings, such those happening in medical research or drug testing. The misrepresentation of publishing activities can be summarized as follows:

> NR. OF ARTICLES = PUBLISHING PERFORMANCE = SCHOLAR PRODUCTIVITY = PROXY OF ACADEMIC QUALITY

Most inquiries indicate a "very weak" correlation between individual abilities and scientific productivity. The same can be said about the correlation between time spent in the process of publishing research and the output of research work. This is related to teaching as a mandatory activity, which is responsible for splitting the time most academics have to do research. Another fact regards the problem of resource distribution. It is almost obvious to find that scholars with more funding are in the position of being more productive than those with less or no financial support.

Yet a different point relates to the very nature of the communication process itself. This refers to "cross-fertilization of ideas", which happens through intellectual synergy among colleagues in very spontaneous and unpredictable ways. In other words, it means that the enhanced productivity in publishing may be an effect of the bureaucratic need for points in an academic index. This explains the compulsory co-authorship between professors (advisers) and doctoral students, which helps to train students in publishing activities and gives advisers needed points towards their ranking.

These are other effects of a focus on productivity. The issue foremost ignored in this discussion is the fact that productivity does not address quality. This leaves unanswered questions regarding the meaning of "performance" in academic environments. Should we take a more quantitative or a more qualitative form of assessment? There is enough evidence to show that the institutional context shapes individual behavior and work habits in what they concern publishing, co-authoring and collaborating.

New theoretical framework

> "...ontologies, schemas, knowledge representations, call them what you will - should be produced by people trained in the humanities... Humanists still need to acquire the skills that allow a more expert and authoritative contribution to the discussion of digital and Web Infrastructures which are currently, and unhelpfully, dominated by computer scientists and technologists. In this respect the quote above from John Unsworth, nearly 13 years ago, still remains true." (Oldman, Doerr, & Gradmann, 2014 - p. 20)

The investigation of the co-authorship of texts can offer profound insight into the interests and motives behind the decisions taken by scientists in collaboration. However, we still lack a common qualitative framework to analyze such drivers and motives, and quantitative methods are not appropriate to explore the depth of this

issue. Most recent studies propose a more meaningful approach; however, they are still incipient and experimental.

Send, Friesike, & Zuch (2014) were inspired by previous studies for their proposal of a structured form to understand motivation. They suggest, for instance, having “fun” as an intrinsic motivational factor. However, the authors also listed “feeling during the task” as a possible motivation, which overlaps with “fun” as a predicting parameter of the contributions' quality or quantity.

One of the problems in the research done at the Humboldt Institute for Internet and Society (Hiig) is that the scientific output is not always intended to be a product, especially in the social sciences and humanities. Therefore, concepts like “sense of efficacy” or “desire to make a better product” do not always represent drivers of scientists' behavior. In fact, both relate to a competitive or egoistic attitude, contrasting with a collaborative or altruistic attitude, which relates to the framework suggested by the present research.

For the work here, this is a power issue also related to competition, and in some cases, it is similar to the motivation of having “fun” in the research process. The nature of the problem is also defined by the fact that in most cases, contribution or participation in scientific work does not reflect any kind of direct economic reward or political gain. In fact, it is quite the opposite.

An assumption that can be made here is that such studies hold an ideological preference for individual interests. It is a premise where “beating others” functions as an extrinsic egoistic motivation for collaboration. And it can be applied in different cases and contexts. Other forms of extrinsic factors are “knowledge expansion” or “career development” (p. 34). The extent to which these are determining factors for co-creation remains a matter of speculation. The lack of a coherent framework to understand issues of motivation impede the application of findings from one study to another, since "the studies examine highly different settings" (p. 36).

What became clear from studies like these are the underlying issues regarding co-creation, always related to the role of the context. This is the main argument impeding the application of a single general framework with which to analyze cases . By now, Library and Information Science research should consider more studies in the field of psychology, and particularly regarding the role of “expectancies” within

specific contexts of collaborative work among scientists. The impacts of community managers in the research process are also still lacking basic data (Send, Friesike, & Zuch, 2014 - p. 38).

In order to address the issue of context, I propose a formal framework based on several previous studies, including my own Master Thesis from 2006. It is based on three dimensions or drivers in the academic context (technological, institutional and cultural), which represent the key factors that currently influence collaboration.

The cultural and institutional drivers relate more directly to context differences, and clearly prevail in terms of shaping attitudes and procedures. Technology, by itself, does not change the way people work, and when it does, it entails an entire set of cultural and institutional norms going along with it. The image below illustrates my initial idea of the relationship among the dimensions, and the predominance of cultural influences, over institutional and technological ones.

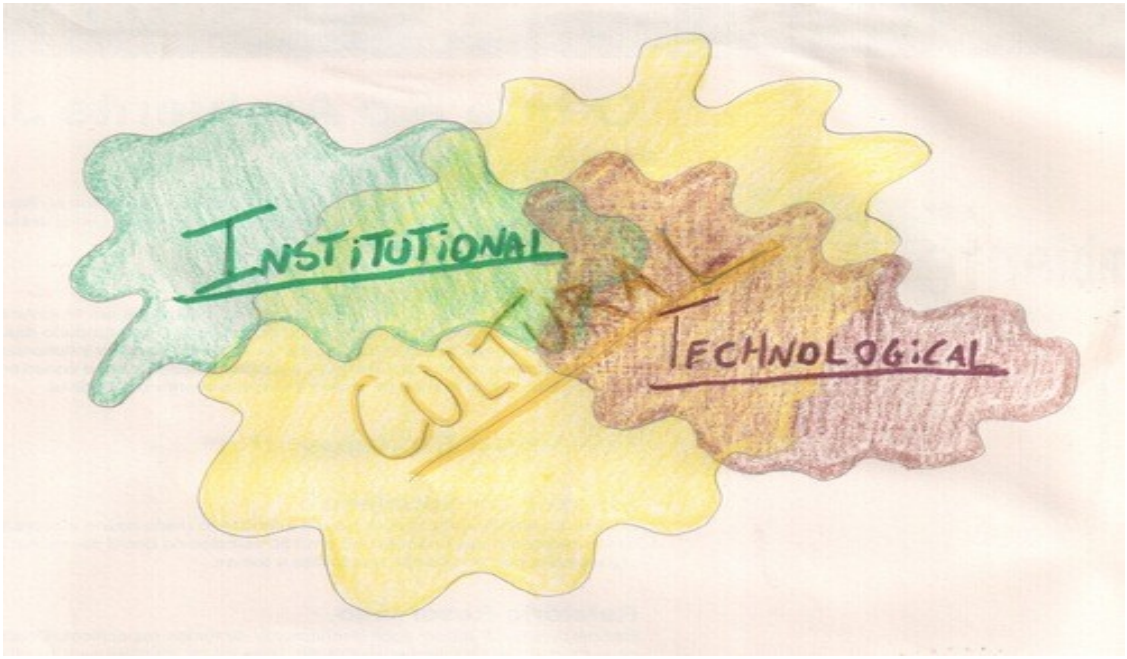


Figure 12 - Core dimensions influencing research collaboration (Senna da Costa, 2008)

It is common to describe institutions or technologies as having their onwn sub-culture. Indeed, culture is embedded in all aspects of technology, as every technology holds a specific set of norms and codes that are akin to cultural phenomenon; as described by authors like Neil Postman (Technopoly, 1993) and

Harold Innis (The Bias of Communication, 1951), every technology encapsulates a specific cultural setting.

In a similar fashion, every institution has its own “culture”, based on its history, procedures and goals. Therefore, based on my recent work that intended to unveil a framework to understand motivational factors for co-creation, I improved the graphical representation above. By replacing the complex concept of “culture” with “person”, the idea was to help inspire a more practical and common understanding about real factors that influence academics when producing and publishing information. I call this framework “the academic context and its drivers”.

Among its most important aspects, is the interdependence among all the three main drivers: Person, Institution and Technology. For instance, the values and beliefs of an individual scientist operate according to the norms and structure of the institution in which he or she works, and also depends on the features and settings of the technology available.

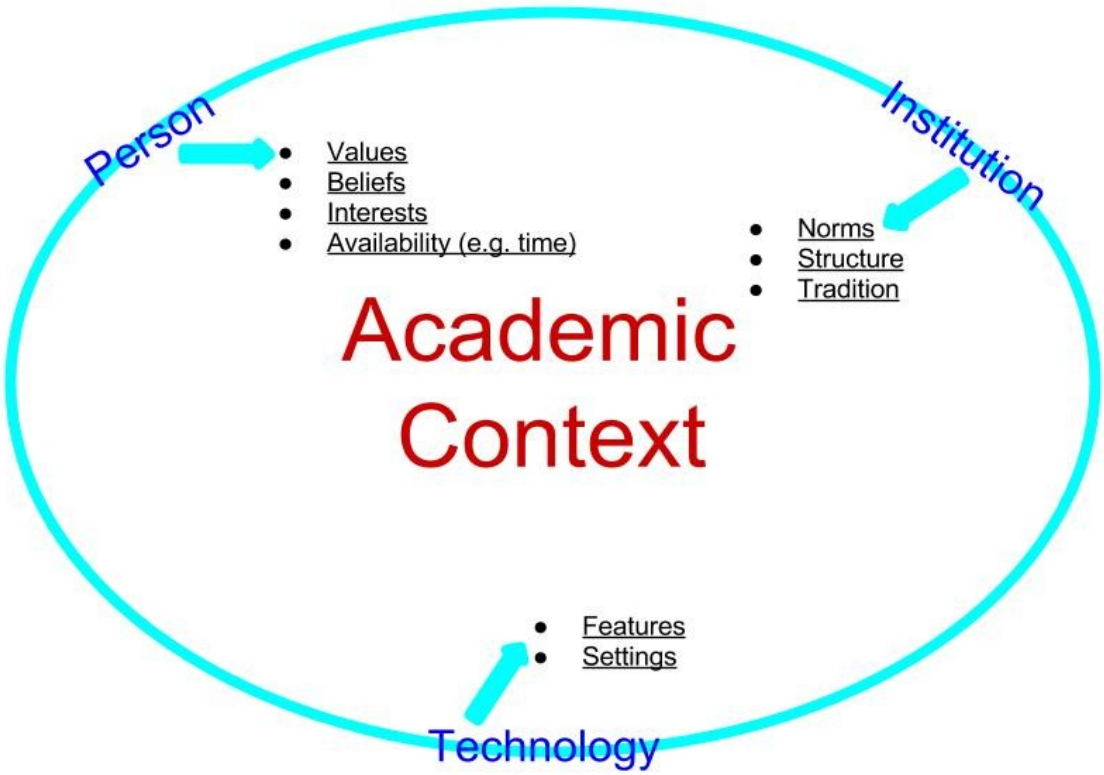


Figure 13 - The academic context and its drivers (Senna da Costa, 2014)

In the present work, the focus lies on the role of the institutions. Institutions normally act to limit empathetic feelings between disciplines, as well as based on hierarchical, social, cultural or ethnic differences, and thus introduce the foundations for separation and competition among people and groups. In other words, the interactions and outcomes of an individual are structured and conditioned by the characteristics of the institutions they belong to. In a broad sense, institutions define the way technologies are used, and they do so according to three main factors:

(1) General co-ordinates - conditions on the level of law, politics and discipline
(2) Economic factors – hardware, software, and access to the networks (e.g.: databases etc) require a considerable budget
(3) Cultural parameters - impact over traditional ways of doing research. (Nentwich, 2003)

As cultural patterns are ingrained and relatively more difficult and slower to change, an effort through institutions to increase social balance and cohesion should be done to counter natural individualistic attitudes. The suggested framework may contribute to the creation of a consistent form to explain and assess the drivers of an academic context according to two qualities: altruistic/collectivist and egoistic/individualist.

Henceforth, technologies could be considered more egoistic or altruistic according to their features and settings. Institutions may be described as more egoistic or altruistic according to their norms, structures and traditions, and individuals could also be evaluated according to their values, beliefs and interests as more altruistic or more egoistic. Such an assessment would be a first step towards the establishment of policies to counter-balance the natural inclination of persons towards egotism, and the economic, political and social pressures that academics currently face.

Far from presenting a harsh perspective, the intention of my analysis is to draw attention of the readers about problems long enough well known, but also until presently neglected. I hope the framework described here can be used to base some philosophical insights, and if possible, few practical innovations in order to improve collaboration among scientists from disciplines other than Forestry.

Further Research

> "This crippling of individuals I consider the worst evil of capitalism. Our whole educational system suffers from this evil. An exaggerated competitive attitude is inculcated into the student, who is trained to worship acquisitive success as a preparation" (Albert Einstein, in Laitman 2009, p 50).

The present investigation confirms a trend verified in other works regarding the configuration of communication services for academics in the era of digital media. It points to an urgent need for more dynamic and flexible structures, such as academic libraries and a knowledge framework. A general question in that regard is, what could librarians add to qualitative information about research practices? It must start with the premise that virtual technology is usually created outside libraries, and do not follow the directives or interests of the libraries at big universities.

Maybe scientists do not need more speed or flexibility: these characteristics would also create a demand for more work and energy to learn and to adapt structures to the new work flow. It is easy to understand the resistance of this target group to adopt new tools and procedures based on the Internet "miracle". After all, in institutional structures, new possibilities of communication are generally perceived as threats to the prevailing order. Virtuality has becoming almost a synonym for additional problems in the academic world.

Recent studies indicate a huge potential for improvements to scientific collaboration, especially in the name of transparent data sharing and re-use. Even considering activities that are primarily collaborative, such as those involved in peer review processes, there is hope for further development of models of content production and data curation that can be increased in scale. The research at hand clearly demonstrates that the main challenges ahead are chiefly political and cultural ones.

7. Acronyms

ABNT - Brazilian Association of Technical Standards
BOAI - Budapest Open Access Initiative
CDMS - Cryogenic Dark Matter Search
CEPE - Board of Education, Research and Extension
CIFLOMA - Center of Forest Engineering at the UFPR
CNPq - National Council for Scientific and Technological Development
CRQ - Central Research Question
CRM - Customer Relationship Management
CSR - Corporate Social Responsibility
DB - Data Base's Technology
ECS - Electronic and Computer Science
ELN - Electronic Lab Notebooks
EPA - Environmental Protection Agency (USA)
ERIC – Educational Resources Information Center
FREE - Federal Resources for Educational Excellence
FSM - Free Software Movement
GII – Global Innovation Index
GLR - General Linear Reality
GMOs - Genetic Modified Organisms
HBS - Heinrich Böll Stiftung
HDI – Human Development Index
HU-Berlin - Humboldt Universität zu Berlin
IALE - International Association for Landscape Ecology
ICT - Information and Communication Technologies
INEP - Instituto Nacional de Estudos e Pesquisas
IPCC - Intergovernmental Panel on Climate Change
IRB – Industrial Revolution in Britain
JISC - Joint Information Systems Committee (UK)
LBA-ECO - Large Scale Biosphere/Atmosphere Experiment in Amazonia
LBNE - Long Baseline Neutrino Experiment Project
LIS - Library and Information Services
LISA - Library and Information Science Abstracts
LRLR - Living Reviews in Landscape Research
MCT / MCTI - Ministry of Science, Technology and Innovation (Brazil)
MPG - Max Planck Society (Germany)

NPOV – Neutral Point of View
OA - Open-Access Movement
OCLC - Online Computer Library Center
OOP - Object Oriented Programming
OSHA - Occupational Safety and Health Administration (USA)
OSS - Open Source Software
PLE - Personal Learning Environment
PNPG - Plano Nacional de Pós-graduacão / National Plan of Post-graduation
PRPPG - Dean of Research and Graduate Studies
RPM - Research Performance Measurement
SCOST – Social Control of Science and Technology
SCS - Scholarly Communication System
SIBI - Sistema de Bibliotecas / System of Libraries
SNA - Social Network Analysis
SSCI - Social Sciences Citation Index
STS - Science, Technology and Society Studies
TQ - Theory Question
TUB - Technische Universität Berlin
UFPR - Federal University of Paraná (Brazil)
UFSC - Federal University of Santa Catarina (Brazil)
VLE - Virtual Learning Environment
WBGU - German Advisory Council on Global Change
WoS - Web of Science database
WYSIWYG - What you see is what you get
ZALF - Centre for Agricultural Landscape Research (Germany)

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9. Appendix

9.1 Quantitative inquiry – SURVEY

Part 1 - Technological literacy and general view on collaboration
Description: Here I asked about habits and usage of communication technology for academic purposes, and about the perception of main characteristics of their collaborative work. It intended to reveal the technological literacy of the group, and how it is related to the collaborative characteristics of their research work.

Question: 1) How often do you use each online technology / tool below listed? (Simple Choice = Frequency)
Options:
a) - **Voice / Instant messaging** (e.g. Skype, MSN, Google Talk)
b) - **Online Bookmarking** (e.g. Connotea, Del.i.ci.us)
c) - **Online tool for creating and sharing content** (e.g. Google Docs, Microsoft Office 365)
d) - **Social networking** (e.g. Facebook, MySpace, Ecademy)
e) - **E-learning platform** (e.g. Moodle, Blackboard)
f) - **Weblog** (e.g. Blog da Floresta, Foresttalk)
g) - **Microblog** (e.g. Twitter)
h) - **Online Public Access Catalog of Libraries** (e.g. OAIster.org, Agricola-USA, The Forestry Divisional Library-Germany)
i) - **Open Access Repository** (e.g. Revista Brasileira de Ciências Agrárias, Agrociencia-Mexico, Open Nature Archive-Belgium)
j) - **Institutional Repository** (e.g. Banco de Teses e Dissertacões-UFPR)
k) - **Feed Reader** (e.g. NetNewsWire, RSSOwl)
l) - **Wiki-page** (e.g. Wikipedia, Wikiversity)

Question: 2) How do you usually EXCHANGE / SHARE academic material, information and discoveries? (Multiple choice = 03 most important tools)
Options:
a) **E-mail**
b) **Instant messaging** (e.g. Skype, MSN, Google Talk)
c) **Social networking platform** (e.g. Facebook, Twitter, Ecademy, Orkut)
d) **Online tool for creating and sharing content** (e.g. Google Docs, Office 365)
e) **Intranet** (e.g. Moodle, Blackboard)
f) **Conferences, workshops, events**
g) **Lectures, informal meetings**
h) **Other**

Question: 3) Which services / systems do you usually apply for PUBLISHING or to DISSEMINATE your work? (Multiple choice = Máx. four (04) options.)
Options:
a) **Personal meetings and talks**
b) **Lectures**
c) **Exhibitions and presentations**
d) **Online Forums and E-mail lists**
e) **Personal webpage**

f) **Institutional webpage**
g) **Wiki-pages**
h) **Weblogs or Microblogs**
i) **Online journals and magazines**
j) **Print-based publications**
l) **Online public access library**
m) **Online tool for creating and sharing content (e.g. Google Docs, Office 365)**
n) **Other**

Question: 4) Could you please indicate the tools you usually apply for REFERENCES gathering / BIBLIOGRAPHY management? (Multiple choice = all options applied)
Options:
a) **LaTex**
b) **Text editor** (e.g. OpenOffice, Microsoft Word)
c) **EndNote**
d) **Zotero**
e) **Citavi**
f) **Del.ici.us / Connotea**
g) **Other**

Question: 5) What are the main characteristics of the research collaboration you are currently involved in? (Percentage Grid / Estimation according to time dedicated and output)
Options:
a) **Distributed** (100% - 0%)
b) **Interdisciplinary** (100% - 0%)
c) **Multi-institutional** (100% - 0%)

Part 2 - Collaborative writing and publishing
Description: Here I asked about the experience and perception of scholars when writing and publishing academics texts in collaboration with other fellows.

Question: 6) Do you publish your "work in progress" in its early stages or it remains currently unpublished? (Simple choice)
Options:
a) **Yes, publicly**
b) **Yes, within my research community / field**
c) **Yes, within a small network of collaborators**
d) **No, but I intend to do in the future**
e) **No**
f) **Other**

Question: 7) To what extent do you agree that other researchers are likely to copy or steal your ideas and work if you publish them online? (Simple choice)
Options:
a) **I strongly agree**
b) **I moderately agree**
c) **I strongly disagree**
d) **I moderately disagree**
e) **I have no opinion about**

f) **Other**

Question: 8) How many academic articles do you usually write per year? (Simple choice / Texts published in the last 12 months)
Options:
a) **None**
b) **1 to 5**
c) **6 to 10**
d) **11 to 20**
e) **more than 20**

Question: 9) From these, how many articles did you write in collaboration with other fellows? (Simple choice / The most approximate option).
Options:
a) **None**
b) **Almost none**
c) **Less than half**
d) **More than half**
e) **Almost all**
f) **All**

Question: 10) How big is your academic network of collaborators / co-authors? (Simple choice / Estimated number of co-authors for the last year)
Options:
a) **1 up to 3 fellows**
b) **4 up to 10 fellows**
c) **11 up to 20 fellows**
d) **More than 20 fellows**
e) **I don't know**
f) **Other**

Question: 11) What tools / procedures do you usually apply to perform collective writing / co-authoring? (Multiple choice = up to 03 (tree) most applied options)
Options:
a) **Word documents via E-mail**
b) **Public discussion forums** (e.g. Yahoo lists)
c) **Intranet platforms** (e.g. Moodle / Blackboard)
d) **Online tool for creating and sharing content** (e.g. Google Docs, Office 365)
e) **Wiki-page** (e.g. Wikiversity)
f) **Weblog** (e.g. Foresttalk)
g) **Institutional repository** (e.g. Banco de teses e dissertacões-UFPR)
h) **Online publication** (e.g. Revista Floresta, Open Journal Systems)
i) **Other**

Question: 12) Could you please indicate the relevance of the barriers listed below regarding collaboration / co-authorship on your scientific field...
Options:
a) **Unorganized information flow**
b) **Data deluge / excess of information**
c) **Online tools lack trustful processes**

d) **Bureaucratic requirements for researcher**
e) **Missing incentives towards collaborative research**
f) **Trust and dialog are harder to be produced at virtual environments**
g) **Spirit of concurrence at academic environment.**

9.2 Qualitative Inquiry - IN-DEPTH QUESTIONS

Below it is possible to see the structure of the questionnaire, its goals and the development of the interviews, which are going to be documented at the end of this text.
Scope: Perceptions of academic publishing culture, co-authorship and collaboration in general

Part 1 - Individual Interests & motivations
1) Regarding authoring and publishing texts, what are the main motivations / reasons behind the choice of certain communication tools / procedures at academic environments? Give example of tools according to the answers from the survey... For instance: Do you have your own page or weblog? Is there any offer from your academic institution in that regard?

2) How publishing scientific texts / papers contributes to your academic career? Is there any different impact whithin co-authored publications? Explain, give examples... How are co-authored and single authored texts valued / counted?

3) Therefore, what are the current motivations for you to write articles together (in collaboration) with other fellows? Some possible answers are:
* Decrease conflicts of interest
* To get it easier
* Expert knowledge interaction
* Improve carreer records
* Improve institutional ranking
* Improve the visibility of own work
* Access special fundings opportunities etc

Part 2 - Internet & Publishing Culture
4) Are there certain journals in your field that count more for promotion and tenure? Therefore, what is your perception of the "open access" publishing phenomena? It offers extra incentives for collaboration via Internet? How? Have you published works under open access licensing? Why?

Part 3 - Institutional Policy
5) Do you have any offer from your department of courses, upgrades, actualizations etc, of new tools for academic networking, research collaboration or co-authoring? Please specify when, what, how, and comment the results and benefits.... Are there institutional incentives to try out alternative tools / methods?

6) Please, explain how the main barriers / impediments for the full development of scientific collaboration operate in your department...Some possible options are:
* Institutional policy
* Cultural change
* Information organization
* Information services / structure at my institute
* Knowledge access and transference

* Content qualification and eligibility
* Financial support
* Technological literacy
* Better software tools
* Lack of awareness for comunication issues
* Problems of administrative / institutional structure
* Lack of trust
Please explain a bit each of your choices...

9.3 List of interviewees

Interview Nr. / Name	Position	Listed on Website
1st., Marisa Soares	Post-Doc Researcher / Assist. Professor	No
2nd., Joao Garzel	Professor	Yes
3rd., Daniela Biondi	Professor	Yes
4th., Antonio Higa	Professor	Yes
5th., Julio Arce	Professor	Yes
6th., Ivan Crespo	Professor	Yes
7th., Sebastião Machado	Senior Professor	Yes
8th., Márcio Rocha	Professor	Yes
9th., Romano T. Junior	Professor	Yes
10th., Carlos R. Sanqueta	Professor	Yes
11th., Alexandre F. Tetto	Associate Professor	No
12th., Antonio C. Nogueira	Professor	Yes
13th., Nilton J. de Sousa	Professor	Yes
14th., Rui A. Maggi	Associate Professor	No
15th., Nelson C. Rosot	Professor	Yes
16th., Sylvio Pellico	Senior Professor	Yes
17th., Setsuo Iwakiri	Professor	Yes
18th., Franklin Galvão	Professor	Yes
19th., Christel Lingnau	Professor	Yes
20th., Vitor A. Hoeflich	Professor	Yes
21st., José G. Prata	Associate Professor	No
22nd., Nivaldo Rizzi	Professor	Yes
23rd., Yoshiko S. Kuniyoshi	Senior Professor	Yes
24th., Carlos V. Roderjan	Professor	Yes
25th., Antônio C. Batista	Professor	Yes
26th., Ricardo J. Klitzke	Professor	Yes
27th., Anselmo C. Neto	Professor	Yes
28th., Renato T. Filho	Associate Professor	No
29th., Ricardo Malinovski	Associate Professor	No
30th., Carlos E. Camargo	Professor	Yes

31st., João C. Moreschi	Associate Professor	Yes
32nd., William Wendling	Assistant Professor	No
33rd., Afonso F. Filho	Senior Professor	Yes
34th., Simone Morrone	Associate Professor	No
35th., Ricardo Berger	Professor	Yes
36th., Roberto Hosokawa	Senior Professor	Yes
37th., Ivan Tomaselli	Senior Professor	Yes
38th., Dimas A. da Silva	Professor	Yes
39th., Ghislaine Bonduelle	Professor	Yes
40th., Ronaldo V. Soares	Senior Professor	Yes
41st., Umberto Klock	Professor	Yes
42nd., Alessandro Angelo	Professor	Yes
43rd., Celso Garcia Auer	Associate Professor	Yes
44th., Nelson Y. Nakajima	Professor	Yes
45th., Graciela B. de Muniz	Professor	Yes
46th., Gustavo Curcio	Professor	Yes

9.4 Survey's and Interviews' Answers

9.4.1 Questionnaire Answers

1) How often do you use each online technology / tool below listed?

Indication of the frequency in which each tool is used.

The question intends to reveal: - What are the most used tools? - What are the less used tools? - How often/frequent each tool has been applied (without differentiate "active" from "passive" user)?

a) - Voice / Instant messaging (e.g. Skype, MSN, Google Talk)

Options	Respondants	%
Never	11	24%
Seldom	5	11%
Monthly	2	4%
Weekly	9	20%
Daily	19	41%

b) - Online Bookmarking (e.g. Connotea, Del.i.ci.us)

Options	Respondants	%
Never	38	83%
Seldom	6	13%
Monthly	2	4%

Comments:

Most of them use the bookmarking tool of the browser, but this refers usually to informal searches while navigating in the Internet, without a direct connection to academic activities. Scholar gathering of information is done within more conventional tools (e.g. List of publications on a word document).

c) - Online tool for creating and sharing content (e.g. Google Docs, Microsoft Office 365)

Options	Respondants	%
Never	29	63%
Seldom	13	28%
Monthly	2	4%
Weekly	2	4%

Comments:

One declared to know Google mail, but ignoring Google Docs / Google Drive.

d) - Social networking (e.g. Facebook, MySpace, Ecademy)

Options	Respondants	%
Never	25	54%
Seldom	4	9%
Monthly	2	4%
Weekly	4	9%
Daily	11	24%

Comments:

LinkedIn is the most used social network platform. As Facebook is regarded as a “gossip site”.

e) - E-learning platform (e.g. Moodle, Blackboard)

Options	Respondants	%
Never	18	39%
Seldom	10	22%
Monthly	5	11%
Weekly	9	20%
Daily	4	9%

Comments:

Some interviewees use an E-learning platform developed specially for a distance learning course, which is coordinated by some staff at the UFPR's Center of Forest Engineering. The UFPR hosts such courses as part of the strategy to extend the activities of the university to other environment, and for a public that usually has no conditions to attend classes in the campus.

Others have problems to understand the definition of an E-learning platform: "What's E-learning?"

A couple regard “E-learning platform" as his own academic website, used in general to gather and share material with colleagues and students, or for marketing purposes. One refers to "E-learning platform" as the Intranet of his own company.

Other refers to the Intranet of the public company he works for as an "E-learning platform". Usually used for administrative purposes, or in order to contact some colleague.

And another interviewee is alumni of the University of Freiburg. He refers to "E-learning platform" as the official platform for foreign alumna in Germany (alumniportal-deutschland.org).

Another refers to “E-learning platform” as the institutional website of the course he teaches ("Industrial wood engineering"), which was developed with "Joomla", an Open Source tool.

And at least one refers to "E-learning platform" as the institutional webpage of the Ministry of Education and Culture.

But in general, E-learning platforms often refers to the Intranet usage, which is applied only for administrative tasks and purposes (grades, classes schedule, home-work management, final reports etc).

f) - Weblog (e.g. Blog da Floresta, Foresttalk)

Options	Respondants	%
Never	25	54%
Seldom	10	22%
Monthly	1	2%
Weekly	5	11%
Daily	5	11%

g) - Microblog (e.g. Twitter)

Options	Respondants	%
Never	35	76%
Seldom	5	11%
Monthly	3	7%
Weekly	3	7%

h) - Online Public Access Catalog of Libraries (e.g. OAIster.org, Agricola-USA, The Forestry Divisional Library-Germany)

Options	Respondants	%
Never	17	37%
Seldom	14	30%
Monthly	6	13%
Weekly	8	17%
Daily	1	2%

Comments:

At least one declares to consult catalogues mostly to find new data on his field;

The usage of catalogs refers almost exclusively to the search and consult of publications from Capes (DataCapes).

Some regard Google Scholar as catalogue and search page.

Others refer to Google as a catalogue (OPACs). "Always, when I have any doubt I consult Google first".

And at least one refers to "web of science" as an “Opac".

And another one prefers to consult the catalogs direct on libraries.

i) - Open Access Repository (e.g. Revista Brasileira de Ciências Agrárias, Agrociencia-Mexico, Open Nature Archive-Belgium)

Options	Respondants	%
Never	19	41%
Seldom	11	24%

Monthly	7	15%
Weekly	6	13%
Daily	3	7%

Comments:

The first interviewee - She is a chemistry engineer working with "inventory and management of industrial waste", specially biomass to produce energy, and thinks that Science Direct (Elsevier) is an open-access repository / library;

Other even think that Science Magazine is an Open Access repository.

And another yet refers to the commercial magazine "Ciência Hoje" as an "Open Access Repository".

Other sees Google Scholar and the Capes page as an Open Access or institutional repository, or even an OPAC.

And at least one uses the Dropbox as a repository of material for his classes and researches.

A few refer to "Open access repository" as the page of the Institute of Economy and Forest Production (IPEF).

In general, those who understand what an "Open Access Repository" might be, refer to the CER/PRPPG, what is indeed an “institutional repository”.

At least one declare to receive updates of several Open Access repositories via E-mail (newsletter).

j) - Institutional Repository (e.g. Banco de Teses e Dissertacões-UFPR)

Options	**Respondants**	**%**
Never	6	13%
Seldom	11	24%
Monthly	15	33%
Weekly	14	30%

Comments:

One asks if "Institutional repository" regards to the service of meteorological information (Simepar/INPE/CPTEC).

Another says that "Institutional repository" usage refers to the consultation of magazines and journals as well.

And other regards the "Capes Publications" site as an "Institutional repository".

The consultation of institutional repositories intensifies at the end of the semester or during the preparation of projects and academic material (seasonal).

k) - Feed Reader (e.g. NetNewsWire, RSSOwl)

Options	**Respondants**	**%**
Never	36	78%
Seldom	7	15%

Monthly	1	2%
Weekly	1	2%
Daily	1	2%

l) - Wiki-page (e.g. Wikipedia, Wikiversity)

Options	**Respondants**	**%**
Never	7	15%
Seldom	15	33%
Monthly	5	11%
Weekly	17	37%
Daily	2	4%

Commentaries:

At least one interviewee note that his “preferred media is still radio”, which he listens everyday while driving his car.

It is interesting to note that a couple of the interviewees are retired professors working as volunteers for the graduate program. One of them studied in Viçosa /MG, where the School of Forestry indeed started, and was transferred to Curitiba with the School. He is alumina of the second graduated class on Forest Engineering in Brazil (holds a Master of Science (Costa Rica), Doctorate (Seatle/USA) and PostDoc (Georgia/USA)) and was also a visitant researcher at the Freiburg University in Germany, on a time when the classes were given in English.

Another one, among the first women to teach at the graduate program, declared to prefer “the students to bring her the new information found in the new media channels (Social Networks, Microblogs etc)”.

Today Brazil is involved in many cooperation projects in the field. "From helped, we became helpers".

Some of the interviewees declare to use frequently the Google Scholar and Wikipedia (“extensively”) for academic consultations and searches.

Some tools (e.g. repositories and catalogs) are consulted on a seasonal base: more intensively at the end of the semester or before the dead line of some work or presentation, or when preparing some special project.

At least one interviewee is already using IPad to prepare and share material for his classes.

Many of the interviewees confessed to consult Google on a daily basis. (“The first search is always done there. For academic and non-academic purposes”, or "Starting there I find everything I need", or “preferably using Google when starting a new search or consultation about a new topic “, or “use preferably Google for searching and referencing content”, or “I use normally Google for the first search, what is responsible for a high usage of Wikipedia, as well..”)

And at least one said that “the only online tool he uses is Google”.

Among the reasons for a resistance on the adoption of new tools there is “the automatic association between new tools and more work load."

Another researcher mentions “a process of trivialization of the scientific production”, what includes specially an increase in the quantity followed by a consequent decrease in the quality of scientific works.

Most of the choices here are due to habit, in combination with the institutional structure he works in.

2) How do you usually EXCHANGE / SHARE academic material, information and discoveries?

The three (03) most important tools / services / technologies. People can select more than one option, so percentages may add up to more than 100%.

The question intends to point out: - To which proportion traditional / online media is been used to share academic content? - How much of the population refer to Google Docs / Online shared content creation among the most used? - How much of the population refer to "Intranet" among the most used?

Options	**Respondants**	**%**
E-mail	45	98%
Instant messaging (e.g. Skype, MSN, Google Talk)	11	24%
Social networking platform (e.g. Facebook, Twitter, Ecademy, Orkut)	3	7%
Online tool for creating and sharing content (e.g. Google Docs, Office 365)	2	4%
Intranet (e.g. Moodle, Blackboard)	6	13%
Conferences, workshops, events	12	26%
Lectures, informal meetings	28	61%
Other	10	22%

Commentaries:

They are already using tools like Dropbox, for sharing material; and the use of Webex for video conferences with remote audiences.

Google Docs is already known and used to create content, although the standard is still being the word documents exchanged by E-mail. "Most of the people use the search of Google, thus in some cases it is more convenient to use Google Docs, but it is still as an exception among our current options of tools", declared one of the interviewees..

One of the interviewees remarked that he basically advises students with their thesis and dissertations, besides being the editor of one of the most important academic publications on the field, the "Revista Floresta". To my interpretation this condition might conduct to a biased situation regarding the analysis and selection of articles to the publication in the mentioned journal.

The choice “lectures” refers also to "distance learning courses".

Several interviewees declared to use chat and talk tools for convenience in “quick discussions and spontaneous exchange of material”, since these kind of software is usually installed as features of other often used tools (e.g. accessing Google Talk through webmail).

It is interesting to note that some professors are still working in a old fashioned way, like the one who has a closet in the office with folders for all his classes. In this case the students are still receiving hard copies of the texts and material the use in class.

A few refer to use pen drive specially when the task involve the application of statistics tools for the analysis of data.

One mentioned that he was the first professor to have and use E-mail in the UFPR. This happened through his doctorate in USA, where he got to learn about new digital tools applied for communication at the campus.

Another one informs that his company (engineering) has its own internal communication system, with a repository for relevant documents and literature.

"Conferences" in the case also refers to video-conferences done internally at the Empresa Brasileira de Pesquisa Agropecuária (Embrapa)

3) Which services / systems do you usually apply for PUBLISHING or to DISSEMINATE your work?

Interviewees may chose up to four (04) options. Since people can select more than one choice, so percentages may add up to more than 100%.

The question intends to reveal: - What are the most used? - What are the less used? - To which proportion traditional / online media is been used? - How much of the population is refering to "Google Docs" among the most used?

Options	**Respondants**	**%**
Personal meetings and talks	6	13%
Lectures	17	37%
Exhibitions and presentations	24	52%
Online Forums and E-mail lists	3	7%
Personal webpage	9	20%
Institutional webpage	10	22%
Wiki-pages	0	0%
Weblogs or Microblogs	0	0%
Online journals and magazines	31	67%
Print-based publications	45	98%
Online public access library	3	7%
Online tool for creating and sharing content (e.g. Google Docs, Office 365)	0	0%
Other	3	7%

Commentaries:

All interviewees usually submit their papers at first to print-based publication, **which are the most traditional and better ranked**. However, they admit to be “aware that most of these publications make digital copies of the articles to be available at libraries, institutional portals and other sites on the Internet." “The online publication is due exclusively to the publication on Print-based journals”. At the end, this become a reason for focusing the publishing efforts almost exclusively on traditional print-based journals. But one interviewee commented also the following: "The print-based publications serve to be sent to remote areas, where there is no Internet yet, but where most of his researches happen (education). They are also convenient to be distributed in courses”.

Few interviewees declared to have “already applied Google Docs for editing, and discussing material with students, but never to publish articles”.

Many understand personal and institutional webpage as the same (Curriculo Lates, which is the official platform for academic profiles from the Ministry of Science and Technology). “I consider my page at the 'Curriculo Lates' as my 'Personal Webpage'”. **This demonstrates the effect of an institutional policy towards centralization and normalization of standards for scholars.**
Only a couple refer to “institutional page” as the page of their laboratory (public). For example: herbário online (http://sites.unicentro.br/wp/manejoflorestal/).

Another declared to have an institutional website of one of his courses developed in Joomla.

And only one declared to have his own “personal webpage” (private) together in the same platform as his own "institutional Webpage" (lab), where he has Forum and E-mail lists tools conjugated. He usually applies these pages for communication with students, colleagues and for marketing purposes (consultancy).

A couple declared that “books are today the preferred form of publishing, although they count nothing for the official academic ranking”. “Because of some internal disagreements I stopped publishing on conventional academic publications, such as scientific journals and magazines. **Since I am already retired, and work more for private companies, the publication of articles on journals is not relevant to my career**. Actually, I have a good number of books published, which is not even counted for the Capes ranking”.

One said that “the Intranet is also another channel for such dissemination of knowledge" (Publication). He refers to the possibility of using internal communication tools for chasing audience to the works done by colleagues or students.

4) Could you please indicate the tools you usually apply for REFERENCES gathering / BIBLIOGRAPHY management?

All options used were marked. As people may select more than one checkbox, so percentages may add up to more than 100%.

The question intends to show: - What are the most used? - What are never used? - What is the proportion between "userbased" and "webbased" tools?

Options	Respondants	%

LaTex	0	0%
Text editor (e.g. OpenOffice, Microsoft Word)	46	100%
EndNote	1	2%
Zotero	0	0%
Citavi	0	0%
Del.ici.us / Connotea	0	0%
Other	2	4%

Commentaries:

In general the interviewees declared to use the text editor manually to edit and manage bibliographic lists and references for articles and academic material. At least one of them said to be more confident when “managing manually the bibliography he works with”. Others attributed to lack of time and resources the reason they are not trying the application of more efficient and modern tools available. However, a couple of the interviewees informed to be already familiar with bibliographic systems of text editors such OpenOffice, or EndNote, or Mendley Desktop.

IN-DEPTH QUESTION (**Individual Interests & motivations)**

What are the main motivations / reasons behind the choice of certain communication tools / procedures at academic environments? How your current communication habits are built? Give example of tools according to the answers from the survey... For instance: Do you have your own page or weblog? Is there any offer from your academic institution in that regard?

ANSWERS:

- I use accordingly to my needs and trying to keep hold of the new tools (digital) appearing recently. The university is like a mother, it offers all support to keep its staff up to dated. You don't actualize your self if you don't want? Many times what is **lacking is time** to see and learn all new things appearing on the Internet. But it is a matter of what I want, therefore it can happen that a new tool that I haven't seen until yesterday, I will start to use tomorrow... She has no weblog, for instance (1st. Interview, Marisa).

- Uses Google as the main search engine, even for academic works. Once a month uses the institutional repositories... **Wikipedia is also a tool used on first sight research (beginners and first academic search)**...

- The choices reflect issues regarding the activities of a professor or a researcher in a certain environment. Here, usually **the work of a professor that is also a researcher, is very lonely**. Most of his work is done alone, isolated. Thus you have to limit the use of certain tools... too much access, or too much communication in case is a hurdle (I need to be concentrated, and not disturbed in certain occasions). It is also important to consider the **lack of time**, since a professor here have many other tasks (bureaucratic and administrative) to accomplish.
- Or when working in collaboration, we almost always prefer to work together with the students I am advising. For instance, some of **my students are also teaching / lecturing**

under my supervision what is a mandatory requirement from CAPES. (2nd Interview, Joao G.)

-The main problem at the university is the **lack of infra-structure (e.g. the web server)**.
- She seldom reads weblogs, but **do not have time** to have one.
- Don't have and do not want to have accounts on social network platforms (e.g.Facebook). She is happy with **the Curriculum Lates** (oficial platform of the Ministry of Education)... "It is a very profissional platform".
- Consult institutional repositories (including Open Access) in order to check out for actual information on topics she is working with...
- Consult but do not trust wikipedia and Google Scholar...
- In my age, I think I feel not so comfortable to try out new tools, it is **a matter of convenience**, what also includes the **precariousness of the infra-structure** at the university... (3rd Interview, Daniela B.)

- I don't know if it is a resistance, but it is more **a matter of priority**. There is a huge **lack of time** to deal with all tasks we have to deal with... Of course this is a matter of how old a person is. My generation was trained to work without this paraphernalia for communication, what in many cases is just superfluous to the work we have to perform. For instance, I graduate in 1975, and at the time there was no computer at the university... today we have an excess of information, but the quality has not been improved to the same extent... some students today do not know how to write properly a simple document, like a requisition.... It is true that the institution does not encourage the adoption of new tools for communication purposes... and this kind of change must be enforced, or it is not going to work... (4th. Interview, Antonio Higa)

- The **lack of time** is the main issue. I don't have time even to answer all e-mails I receive... we use tools like webex for distance learning courses and video conferences, but this is usually related to projects of partnership involving private companies and the university.
- I know about other new tools, but I am satisfied with the tools that I currently use, and there is no offer from the institution to use a specific set of tools or a specific tool for any purpose... we are very free regarding that... (5th. Interview, Julio Arce)

- The usage of tools depends on **the demand**... This is also an issue regarding social network platforms (twitter or Facebook), since **I have no time** even to answer all my E-mails... I have no weblog for this very reason...
- He is a teacher only in the graduate program (Master and Doctor)... my area of teaching and research is by nature interdisciplinary (6th. Interview, Ivan Crespo)

- I am from a time where there were none of these tools, therefore I am not addicted to them. I try **to attend the requirements of the institution** and of the publications I am used to publish... they (publications) have certain norms, and I follow them... for example, the format of the document (doc or docx) is a requirement from the publications... the same regarding the graphic characteristics of the text... (7th. Interview, Sebastião Machado)

- It is a mix between **convenience and chance**... you learn what you have the chance to... and indeed what I can use satisfies me... **I have no time** to learn new tools, and the University does not offer or requires almost no specific tool for academic communication... **it is a negligence of interest (from professors side) and a lack of policy (from the institution).**..
- He uses daily new tools like skype, Gdocs, but for non-academic communication at most... Intranet, E-learning platforms (when available) are used exclusively for administrative or bureaucratic means...

- Most of national Journals on the field of forestry can be accessed online for free... (8th. Interview, Márcio Rocha)

- It is a result of habits built for long time... usually you learn a new communication tool spontaneously with students and colleagues that already tried them out and show you how to use it... informally... and through the time you settle with what you have to work with, and at the end it is enough to accomplish the tasks you must do...
- No, **there is no policy, or rule, or incentive from the institution in that regard**... (9th. Interview, Romano)

- We do not have control of the tools we use. We use what we get. The most important feature is that the tool must be limber / agile, besides attending technically our needs. Also **time and priority play an important role**. In certain situations is more secure to use an old tool, doesn't matter if it is slower or unfriendly, than to learn how to operate a new one that may have some bugs or problems that you don't know yet. It may be a matter of practice or an **adequate structure** to keep the staff updated to the most modern and efficient technology available.
- We have a web page from our lab. But we use it mainly to advertise topics or information regarding our work and goals. Its function is not to propagate or distribute scientific information specifically. (10th. Interview, Carlos Roberto Sanqueta)

- User friendly and habit. I would apply most modern tools, if they offered features appropriated to our specific needs. Each publication has also distinct **demands or norms for publishing**. A **communication body or structure** to support us in such work would facilitate the application of more modern tools in our context. There is no offer from the institution in that regard. (11st. Interview, Alexandre F. Tetto)

- **Habit** in combination with **lack of information** about more modern and efficient tools. There is **no offer, or support from the university** to improve our communication habits. There is a **culture of individualism** in that regard. Each one must take care of your own work and therefore the communication of this work internally and externally.
- In this context **lack of time** is determinant, as the age and time of work of our staff as well.
- It is important to mention that in many occasions we get helped by our own students, in the process of learning or applying better tools to analyze and communicate our research work. (12nd. Interview, Antonio Carlos Nogueira)

- We take the tools we already have and trust. To try out new things demands a great effort (**energy and time**), and currently we are overwhelmed by the on going demands of the department / program.
- I have no weblog or personal page. All my virtual presence is due to my academic work to this institution here. But each one has to take care of the communication of his own work. There is **no offer from the institution** in that regard. It is a **personal interest in our context**. (13rd. Interview, Nilton José de Sousa)

- If I have to share some information with someone I use E-mail, and if I have to find or contact some person then I apply social networks.
- **Complacency**... we tend to enter promptly on to comfort zones. The organization of our time here also represents an additional barrier, since **we spend a lot of time pursuing tasks that are not directly related to our academic work**. For example, obligation to take part in commissions or groups responsible to administrative issues. It means, many professors here, beside their activities as teachers and researchers, have to dedicate much of their time and energy to bureaucratic and management problems. (14th. Interview, Rui A. Maggi)

- I have **no time** for new tools. **Complacency** is a factor, since new tools demand always an extra effort to learn it. Here you have to take care of this issue by yourself, and if the tools you currently use are fine in doing the things you have to do, then it is obvious that we won't try out new approaches... it is **a context that does not motivate anyone in trying better tools**. (15th. Interview, Nelson Carlos Rosot)

- I've been provoked by colleagues to try out new tools. But I'm still keeping my posture of being alienated to these kind of "new trends". Why? Because they mostly require **more time** from you, without representing **any gain in productivity** to my academic interests. It is a matter of focus as well, since most of these tools serve almost exclusively to distract you from the work you have to do.
- On the other hand, I use frequently the Wikipedia. Why? Because I do frequently genealogical research, and there you find very good information (clear, objective and trustful) for the first search. And from there I can go deeper into my research in others databases or sources.
- I agree that some tools could help to improve our communication when working together with other fellows, but in general my work consists of mathematical calculations that we can only discuss in face-to-face meetings. Even via e-mail, such exchange of arguments would take much longer and require much more effort, than a personal meeting of 30 min. In other words, to interpret the meaning of certain calculations, formula and statistics it is still more efficient to sit around a table and analyze the data together. Another reason is also that our current statistical tools (E.g. Equation) can not be embedded in any communication tool we know. But this can be due to the fact that we take care about this issue by ourselves. **The institution offer no support or directive in that regard**. (16th. Interview, Sylvio Pellico)

- I use only what I need. And for my activities here I am satisfied with the tools I already know and use. I don't feel the necessity to try out better tools. I don't need them. (17th. Interview, Setsuo Iwakiri)

- **It is a non fundamental issue**. We are more focused (by the institution) on teaching. There is no routine of scientific production by itself, it is dependent on teaching activities. Therefore, **we do not care so much about how to improve writing and publishing processes**. We use what is readily at hand. In fact you will need **more time to improve any part of our academic communication**. (18th. Interview, Franklin Galvão)

- I don't know. Maybe E-mail is simply the easiest form to me. I think the management of communication in the Internet by the UFPR is a difficult issue. **I just do not know how to use the communication resources available at our institution** (e.g platforms, weblogs, intranets etc). On the other hand, even the use of E-mail inside the university's network is complicated. There is a limit, for instance, in the number of addresses to receive my messages when I use my UFPR E-mail. It is due to the anti-spam norms of the university. (19th. Interview, Christel Lingnau)

- Many tools I never used because I never heard about them.
- For publishing, we have **in the agrarian sciences very few options outside the mainstream of traditional publications**. It is a very conservative field. And we choose the publication to publish our papers according to **the rules and norms** that the CAPES established to evaluate our work. **This shapes mainly our way to work.**
- We have **no offer from the institution**, and therefore we use those **tools that we are more familiar with** and that are convenient to our objectives and structure... there is a complete **lack of a institutional policy** regarding communication among professors and researchers...
- In other words, you don't use better tools because the academic "system" is not using them... (20th. Interview, Vitor A. Hoeflich)

- I am a traditionalist... for me as simple as possible... even the tools that I am using I don't like this constant change of versions happening every year...There is a lack of support to keep us updated regarding more efficient tools (e.g. reference lists, I am still doing it only manually).
- New tools, methods strategies are easy to learn when you have no option, when there is a lack of means to do what you want. But once you start to use any tool for such purpose, it is much more harder to replace it, that you are already used to, for a new one. **(inertia + fidelity)**.. I have a resistance to keep experimenting new things, it is easier to stay with the things I already know and trust...(habit) (21st. Interview, José Guilherme Prata)

- He does not know what is Intranet, or what the Capes website is... However, he consults weblogs on a weekly basis... the same stuff to magazines and journals of the field... but no one ask for subscription or charge any price for... the access happens through the university's system...
- He has an institutional website: www.hidrologia.ufpr.br.... it requires login and store material for the classes... he distributes the material for the classes and lectures through this site...
- My choices are taken according to an equation: **adaptation to infrastructure, objectives and time available**. We do not perceive advantages in trying new tools.. it is conventional, everyone here works in the same way... .doc archives sent by E-mail...
- Some interfaces of these **new programs are not user friendly**... (22nd. Interview, Nivaldo Rizzi)

- She is already retired since 11 years, but keeps working as adviser and as senior professor...
- These new tools, like social networks (Facebook) they require a lot of time, and **time is what I am still lacking**, specially for unimportant things...
- I just read, check or look things that other people send to me (e.g. weblogs links and texts)... i have not the habit of searching for new things on the Internet... I am already **overwhelmed by the demands** I already have... Well, my students help me to be updated with the new trends and expert information on my field of work. Weekly I check catalogues and lists of traditional sources of expert information, but this is only in order to suggest bibliography applied to their researches...
- The new tools or vehicles (e.g. Wikipedia) I use without paying attention to the name or their functionality. **I am happy with the options I already have**.
- She is used to review articles on line, but she does not know what is the system about. She refers to it as the "Internet". The editors send the link of the article, with password to access a closed environment where the article can be accessed and reviewed..
- **The tools and procedures I use is oriented by the demand and the context.** It means, that what I know and use now has been enough in the last years to attend the requirements and demands I am faced with.
- I was the first woman here, and I am not from forestry... I am a conservationist... (23rd. Interview, Yoshiko Saito Kuniyoshi)

- I am using only what I need... and therefore I use only the trivial.. what everybody also uses... I don't need to search or try new tools... even if a new tool could improve my work, but **in my position today I do not need them, it is not indispensable**.... (24th. Interview, Carlos Velozzo Roderjan)

- **I knew Google Docs (Drive), from a friend that suggested it to me. But I found it very complicated, and left it aside.** I am a self-taught in computer programs, then new things usually are very complicated, and I don't want to ask for help in these issues... My friend showed me how to add a document in the management files systems of the Google Docs, but I couldn't find myself in the management system.

- Apply the Word (.doc) to manage manually the bibliography of articles... "**I am not familiar with any modern tool for this purpose**". (25th Interview, Antônio Carlos Batista)

- We started to have problems with our e-mail from the UFPR.... I don't remember what exactly, but it stop working properly... then we decide to change to Google as our main E-mail system, and I was the last one to shift to Google...
- How I proceed today when searching for expert information? My preferred tool are the bibliography of articles I find in journals and scientific magazines in combination with the Google search engine... when I identify some interesting information in an article I first consult the reference list of this article in order to find the primary source of the information... then I take the author or title and search it with the Google... only this practice gives me more than enough information about any topic I might be searching today... seldom I use the traditional catalogues and libraries for searching authors, topics and researches...
- Newsletters from associations and other research centers are the best and faster way to keep me updated on my field of research... I receive a couple of this kind of newsletters per week...
- **The university has to improve a lot its work on communication**... we do not have a clear policy, therefore there is no funding regarding communication activities... it is a matter that **each professor or student has to take care of the communication of his own work**, but it should be an institutional priority...
- One of the main reasons for our retardation on working with more efficient tools for communication is our **total lack of awareness**... we work with what we get.... **self-indulgence** is also an issue, but **the lack of a clear institutional policy helps to shape behaviour that is convenient but not efficient.**.. (26th. Interview, Ricardo Jorge Klitzke)

- Most of recent tools are just "**time killers"** for me... And I don't have time to waste... they are things for teenagers...
- Wikipedia I use very often (twice a week)
- Even to share documents, links and information the preferred tool is the E-mail...
- I have a personal page, a private one...
- I manage my reference list / bibliography of my articles manually... I know that even the last versions of text editors offer an automatic manner of doing this, but I didn't learn how to use it yet...
- **Habit and time** are decisive factors influencing my choices... I don't have time even to answer properly all E-mails I receive... But I am aware that certain tools can facilitate many tasks of our daily routine... defenses and presentations, for instance, can be done via Skype, with participants in many different locations. (27th. Interview, Anselmo Chaves Neto)

- He is doing a doctorate...
- He would like to have his own page, but it is not easy as he thought... "It requires a bureaucratic effort, and currently I have no time to pursue this... but there is no offer from the institution in that regard, if you want you can get some support for it, but there is **no policy regarding this (communication)**...
- **Easy adaptation** is the main factor influencing my decisions of tools I use... it is a matter of what I already know how to use, or that it is easy enough to learn quickly... (28th. Interview, Renato)

- I have a website for academic and scientific purposes (28.000 access per month... "colheita de madeira" in ASP made by an outsourced programmer and financed by the professor himself, it is linked to others professional and academic networks, and has sophisticated tools like newsletter send to a mailing list (1.400 subscribers) stored and managed through the website itself)... It was my own initiative without any involvement or support from the university...

- It is a complex issue, since the number of tools available is already huge... **I use what I know and judge pertinent to my goals**, but I am also aware that probably all the tools I know may not represent 5% of all tools available nowadays in the world... and considering my **absolute lack of time**, it would be impossible to be up to date regarding this issue... it would be more efficient, I think, if the university had someone to help professors in that regard... also the heterogeneity of the tools applied by different professors doing similar tasks... it means, some professors are used to work with different tools than I and vice-versa...
- He has his own company... (29th. Interview, Ricardo Anselmo Malinovski)

- As I was educated and trained without this abundance of tools we currently have, I am still using the tools I learn first (E-mail, for instance)... **also those which are easy to use, or absolutely necessary.**.. but I don't have the necessity to seek for new and better tools... it could make my routine work much more complicated... (30th. Interview, Carlos Eduardo Camargo de Albuquerque)

- I was already retired since 1997. I worked for a while as senior professor here. Then the law changed, and my salary was cut in almost 50%. I ordered my dismissal and applied to become assistant professor again. But it is still hard to work here, thus I am about to retire again. I am on my limit. I am tired of preparing classes and school examinations. Therefore I am not looking for better ways to improve my way of communicating my work. I have **no motivation** for doing so, and I have **no time** left to invest in such new tools. (31st. Interview, João Carlos Moreschi)

- **I use what is popular**. It is easier to use a tool that everyone is using, even to avoid problems of formatting and discrepancies among different systems... (32nd. Interview, William)

- Usually we learn a new tool with students and colleagues... we (professors) have **no time** to investigate, search and then learn alone the new tools available nowadays..
- One of the possible improvements I am interested in is regarding the automation of the bibliographic management. We do it manually yet. It means that the student has to type or copy and paste the references, and this generates a significant error rate. It would be good to have a tool to perform this task in a more automated manner, but I do not know any program for this purpose. **We lack here at the UFPR expert people to give us support on such matter**. (33rd Interview, Afonso Figueredo Filho)

- It is a matter of how fast and easy to use a tool is... In other words it is also an **issue of convenience**, I have no reason to try out a different tool that nobody here is aware of. It could even create problems of format or of communication between different platforms of software. (34th. Interview, Simone Morrone)

- The E-mail is very easy, and it grew up together with the new habits of the users... We had nothing like E-mail before... Today it is still the most valuable communication tool for us as academics... it is simply **pragmatic and easy to use**... specially in comparison to the previous media we have for the kind of communication we are doing today via E-mail... It can also be an issue regarding **self-indulgence**...
- The ministry of Education and Culture (MEC) is starting to use a moodle platform to communicate and assess the academic performance of graduate programs on national level... but it is being used merely for administrative and bureaucratic purposes... (35th. Interview, Ricardo Berger)

- He was the first student to get back from Germany with a Doctorate on Forestry. His adviser was professor Gerhard Speidel, coordinator of the program at UNDP/FAO aiming to consolidate the implementation of under-graduate and afterwards graduate programs of forestry in South America, including Brazil...
- The main reason for the creation of the Graduate Program on Forestry at the UFPR was that at the time Curitiba had the largest furniture industrial center in South America...
- **I do not know how to use a computer**... my graduate students do any work I need to do in a computer, including my E-mail... most of the new tools I do not know what they are about... I am very happy with my printed newspaper, and my telephone... but all my reports are done by my students... and **even when I have to correct a dissertation or thesis I demand a hard copy**... it is simply more practical for me...
- I am still advising students in a handmade manner... traditionally, with face-to-face discussions and research... **I do not use Internet for this kind of intensive exchange**... To teach anyone is not only to show sources of literature, or how some academic method works... **we have to help and treat the students as a human being** ("...**ajudar humanamente**") (36th Interview, Roberto T. Hosokawa)

- **Practicality, simplicity and familiarity** are the most decisive factors influencing choices of communication tools...
- He is also Ceo of his own company (STCP Ltda), the biggest forest engineering company in Southern Brazil... therefore he uses a system of information and communication (doc repository) developed internally by his staff... it is the main form to exchange information and communication among workers and clients (customs)... it is a tool for projects management... (37th. Interview, Ivan Tomaselli)

- I don't know... I have the impression that new tools demand a great effort in order to keep you updated to the last version with the best features... and in fact people choose and use tools induced by example, **induced by the context**... you hear that some colleague is applying a certain new tool, and then you become aware of it, and then if you hear again good advices regarding this same tool, you may develop a curiosity to try it out as well... I think this is more or less how we chose to use certain tools...
- the precarious stage of the scientific investigation (funding and structure) shapes the behaviour of scientists, who seek to **attend first their interests**... since there is a common feeling that it is impossible to alter the context by individual attitude and behaviour (ideological standard).
- Wikipedia is very practical... specially for initial search about a specific topic... (38th. Interview, Dimas Agostinho da Silva)

- There are three or four things I can do in a computer... I use what I already know, nothing else.
- I am not acquainted with the most modern tools... The choice of certain tools is due to my own ignorance regarding the state of art in communication technology... what I already know and use attend my needs... it is a matter of **habit**, in combination with an absolute **lack of time** to search, discover and learn new tools.... (39th. Interview, Ghislaine Miranda Bonduelle)

- Nowadays the grade and the entire management process is done through the Intranet of the university...
- I am still preferring to read printed documents, texts, books... including the review of articles for journals and scientific publications...
- **We learn when we need**, when we have to... it is the main law of learning communication

tools for me... **we adapt to the media according to our context**... (40th. Interview, Ronaldo Viana Soares)

- I am here since 25 years... I perceive a difference in that regard, to try out new tools and processes... **it is a natural discovering process**... today, **we do not have time** to be informed about all new tools appearing... and **you only get motivated to try new things when someone comes to you and tell you to do so.**.. colleagues and students motivate you to try out new systems and procedures... I mean, as our attributions and tasks increase along with the time, our free time diminishes... and therefore you start to use what is the most easy and practical, it means what other people already tested and approved... (41st. Interview, Humberto Klock)

- **Habit** is the most influential factor... I personally like to prospect new tools and sources... however, it is important to consider our current **time constraints**, in relation to the tasks we must attend... Therefore, we must learn how to limit and direct our possibilities and capabilities in order to attend the requirements the institution demand from you.. Because, independent from the tools you use, you have to learn how to think and build up the ideas you want to communicate... **the base of this activity (thinking) is not technological, but cultural**...
- **The choice of certain tools is circumstantial**... it means that considering the number of students I am currently advising, and their habits of communication tools usage, I prefer to adopt the tools they are already familiar with...
- He was the only one to use Google Docs on a weekly base... And he usually searches information randomly, without any specific and credible source in sight... Google Scholar is usually the start. (42nd. Interview, Alessandro Camargo Angelo)

- I was born on the previous century, and therefore I am still using tools and processes from the previous century... in my culture it is important to publish your work on paper (print based publications), because it has an aura of importance that pure online vehicles do not have...And **the administrative and bureaucratic system is still promoting this belief**, since you are required to store (deposit) hard copies of your dissertations, thesis, or simply reports in a system designed and created for printed media (e.g. physical libraries at universities)... including a dissertation must be stored in a physical library in order to be considered at index databases like Scielo...
- The factors influencing my choices are a result of a combination between **my interests and goals, with the target group I need to achieve according to my objectives...** If I want to be read by a certain public, I need specific communication tools... like **the publication on traditional journals is nowadays merely a matter of attending the administrative requirements of Capes and CNPq.**.. If you want to be known on a certain field, you must take part in conferences... and if you want to make some discovery public you may resort on newspapers...
- The tools applied for administrative purposes are used more frequently (at least monthly)... Research tools used frequently are Simepar or the Inpe and Cptech websites, which are repositories of meteorological data... He is taking part in the building of scientific information at Wikiversity (pt)... **his motivations are the absolute lack of another free and easy to use encyclopaedia for the expert information he works with (plants morphology, fungus etc).**.. "**my idea is to help people to have a better information on a field I am familiar with**"... "Wikipedia promotes a more free debate about knowledge and education, which for me justify its quality and scope, much superior of other commercial options"...
- He is researcher of Embrapa... (43rd. Interview, Celso Garcia Auer)

- **We use what we already know**, and not seldom we avoid to learn new and more efficient tools for a matter of **habit** and **convenience** (e.g.: **lack of time**)... only when we perceive that we're late, then we rush back to catch up and adopt new ways of working....
- He also has already participated in some webminars...which were remote broadcast and interactive... Before I didn't want to be exposed... now, with the experience and maturity I lost this fear... at least a bit...
- Google and Wikipedia are the two most used websites, and information systems... (44th. Interview, Nelson Yoshihiro Nakajima)

- We have an **increasing time constraint**... it means that we have each time more things to do in less time.... what is making us to change our way of doing things, and our way of relating to each other. Today you can't think before you react to any demand... you must do it immediately, if you wait it is probable that you are going to forget to answer the demand...
- She does not reflect / think about her choices... "**I use what everyone is using**". (45th. Interview, Graciela Ines Bolzon de Muniz)

5) What are the main characteristics of the research collaboration you are currently involved in?

Estimation of a percentage according to time dedicated and/or output from research activities.

The question intended to answer: - Is there any clear pattern, or usual form and structure of the collaborative work performed (co-located, interdisciplinary, multi-institutional)? - To which extent are the ideal conditions for online collaboration (distributed, interdisciplinary, multi-institutional) already verified? - To which extent are still conventional forms of communication relevant for research collaboration? According to the researchers perception "working alone" is a significant option?

- Within a DISTRIBUTED team (e.g. researchers working at different labs and places)

Options	Respondants	%
100%	3	7%
80%	6	13%
50%	16	35%
20%	16	35%
Nothing	5	11%

- On INTERDISCIPLINARY topics (e.g. with fellows from different disciplines)

Options	Respondants	%
100%	7	15%
80%	10	22%
50%	9	20%
20%	15	33%
Nothing	5	11%

- With MULTI-INSTITUTIONAL structure (e.g. cooperative projects among several institutions)

Options	Respondants	%
100%	5	11%
80%	5	11%
50%	14	30%
20%	18	39%
Nothing	4	9%

Commentaries:

Some of the interviewees noted that the inquired characteristics are increasingly becoming more frequent and therefore important in the fields they work in.
- “I perceive a trend to increase the "distributed", "interdisciplinary" and "multi-institutional" characteristics of my research works”. “Distributed can in certain moments be of 30%, and there is a tendency to increase it”.
A few of them admitted certain pressure / incentives to increase the work on distributed and multi-institutional projects.
At least one interviewee declared to be not sure about to what extent her work is “multi-institutional”.
- “We are simply not aware of such things. It does not matter to my work.” (19th. Interview)

Part 2 - Collaborative writing and publishing

Description: Here I asked about the experience and perception of scholars when writing and publishing academics texts in collaboration with other fellows.

Journals and publishing

The Revista Floresta (http://ojs.c3sl.ufpr.br/ojs2/index.php/floresta/) is a scientific publication edited by the Paraná State Foundation of Forestry Research, the CIFLOMA internal institution taking care of cooperation projects. The journal is the preferred vehicle of academics from CIFLOMA when submitting their papers. It is a quarterly publication, with 500 copies of about 200 pages per edition. The journal contains 20 papers, with an average of 12 pages each. Around 35% (7) of the published articles are authored by at least one academic from Cifloma/UFPR. All articles were submitted between January 2009 and June 2011, being published on the January/March 2012 Edition (Vol. 42 - Nr. 1), what characterizes a time out from 6 up to 36 months between submission and publication. The Revista Floresta is indexed by the following institutions, what makes it one of the 5 most important scientific publications on forestry in the country:

* AGRICOLA - National Agricultural Library (EUA)
* AGRIS - International Information System for the Agricultural Sciences and Technology (Italy)
* AGROBASE - Base de Dados da Agricultura Brasileira (Brazil)
* CAB - Abstracts (EUA)
* CIRS - International Centerfor Scientific Research (France)
* DOAJ - Directory of Open Access Journals (Sweden)
* EZB - Electronic Journals Library Max Planck Society (Germany)
* BDPA/Embrapa - Base de Dados da Pesquisa Agropecuária (Brazil)
* LATINDEX - Sistema Regional de Información en Línea para Revistas Científicas

de América Latina, el Caribe, España y Portugal (México)
* PERIODICA - Índice de Revistas Latinoamericanas en Ciências (México)
* SCOPUS - Elsevier Bibliographic databases (Holanda)
* SUMÁRIOS.ORG Sumários de Revistas Brasileiras (Brazil)

The most important scientific publications on forestry in Brazil are:

* Árvore (Vicosa, UFV);
* Cerne (Lavras, UNICAR);
* Ciencia Florestal (Santa Maria, UFSM);
* Floresta (Curitiba, Fupef);
* Scientia Florestalis (Piracicaba, IPEF).

The Floresta is the less qualified among them (B2). The reason is that it was still missing some international indexes required by the QUALIS classification system (CAPES). However, many professors considered that the quality of the content do not differ, since the board of consultants and reviewers was almost the same on all these journals.

9.4.2 How an academic of Forestry proceeds when publishing an article

The managing editor of the journal, Lucia Burda, gave the following testimony:

- The Revista Floresta is available within the Digital Library of Journals of UFPR, a repository built on Open Journal Systems (OJS), a project developed and supported by the Public Knowledge Project (http://pkp.sfu.ca/ojs/).

"The entire submission process of articles is done online, through the Open Journals System (OJS - Sistema Eletrônico de Revistas, port. Version). Usually the authors submit their texts attached in word document, but they can also submit a document in RTF or in OpenOffice. The file of the article should not be larger than 10 Mb. All instructions can be found directly on the journal website... The average time from the submission until the publication is 15 months. From submission to acceptance the average is six months. The authors must pay R$ 50,00 (+ - 20,00 Euros) per manuscript submitted. And the text submitted must be exclusive, and shall not have been published by any other vehicle before."

"All operations, including the submission are done via attachment of the original file. All reviewers receive a copy of the document via E-mail and they give it back as an attached file per E-mail. The developers had already suggested to implement templates to allow the submission of texts directly on a web page, in order to have all review process online without the need of exchange of attached files via E-mail. The main problem is that I work here alone, and I can not stop my routine work to prepare these templates. Furthermore, I would need to teach the authors this new way of submitting a paper, and in many case this would be an inglorious task, since many scientists here are still needing support even to use their E-mail accounts. And this is also true for most of reviewers. They are way too much used to work in a traditional way. It was already very hard for many when we stop accepting hard copies for the submissions and started to do it online with the attachment of files directly into our website."

6) Do you publish your "work in progress" in its early stages or it remains currently unpublished?

"Online lab notebook", or "weblog" were also considered as working in progress...

The question intends to reveal: - To what extent are academics of forestry in the selected program already opening their work in progress?

Answers	Respondants	%
Yes, publicly	1	2%
Yes, within my research community / field	10	22%
yes, within a small network of collaborators	11	24%
No, but I intend to do in the future	3	7%
No	21	46%

Commentaries:

Few of the interviewees use the page of the laboratory where they work to disseminate fresh information from their researches.

A majority of the interviewees are still usually disseminating their work at first on conferences and congresses.
- To publish information about an ongoing research has two sides: a **risk** and a **opportunity**. The risk is related to the threat that someone may take and use your information / data as it was his own material. The opportunity regards the possibility that through it some potential partner may find you. (1st. Interview)
- I publish my ongoing work publicly in scientific journals... But this maybe a characteristic of my field (economy) where there is no output to be object of patent register... **only the citation of my articles is important**... (2nd Interview)
- Do not publish work in progress... but write and submit preliminary findings as a mandatory requirement of the research funding (**bureaucratic requirement**)... work in progress reports...
- She believes that **publishing working in progress (specially data) includes a great risk of data/information theft.** "I should never publish my crude data in order to avoid to be stolen by some opportunist... I need first to elaborate and analyze the data first as a mean also to ensure my authorship." (3rd. Interview)
- He publish the working in progress only among his fellows or collaborators. Admits the risk of data theft, but do not worry about that... (5th. Interview)
- Do not publish work in progress... only for bureaucratic requirements (project reports)... and among my collaborators... it is something more endogenous, and I would like to break it up... therefore, **I publish books to get out of this cluster culture**... I don't worry about data theft... (6th. Interview)
- I have no chance to publish my work in progress, since the publications I usually work with do not accept uncompleted work. (7th. Interview)
- I prefer to publish completed works not for fear of plagiarism, but just to present something more elaborated, done... partial results are not helpful in my field (economy)... (9th. Interview)
- He does not publish his work in progress... usually only students do so in congress or conferences... but in my case I see no advantage, since it has no official value to my academic records...(25th Interview)

7) To what extent do you agree that other researchers are likely to copy or steal your ideas and work if you publish them online?

The option that seemed to better reflect the perception of the topic...

The question intends to see if: - Do researchers feel threatened by the "openess" and "transparency" characteristic of the "online" communication?

Options	Respondants	%
I strongly agree	6	13%
I moderately agree	12	26%
I strongly disagree	19	41%
I moderately disagree	9	20%
I have no opinion about	0	0%
Other	0	0%

Commentaries:

Most of the interviewees justified the answer to the question with a "cultural or social" factor / aspect / argument.
- "It is like a marriage... there is a risk".
- "It is simply the standard procedure to not expose the work or material under construction or analysis".
- "I don't care!"

IN-DEPTH QUESTION (Individual Interests & motivations)

How publishing scientific texts / papers contributes to your academic career? Is there any different impact within co-authored publications? Explain, give examples... How are co-authored and single authored texts valued / counted?

ANSWERS:

- The publication of texts is very important to my career. It is like the air we breath...
- Both forms of authorship are important. But in many cases a co-authored article is indeed the result of an individual work. For instance, I did a research in Philadelphia where I put the name of the department's coordinator only for **political convenience**. But the work was done only by me, he didn't contributed a single coma. I did the same with another colleague that needed more articles published with his name in order to get a better ranking while competing for a position in a public university.. I did it to help him. But it depends on the convenience in case etc. Sometimes it makes sense to **have on your paper the name of a renowned researcher, and he has also interest in publishing as many articles with his name as he can.**
-Therefore, there is no relevant difference in value between single authored and co-authored articles. (1ST Interview, Marisa)

- The graduate courses are an option to professors. They may, or may not take part in teaching activities of graduate courses. Our University was created based on the German model, where research and graduate courses are a very important part. Teaching on graduate courses was until some time a voluntary initiative of professors that wanted to increment their status and quality of their knowledge. Few years ago the CAPES introduced a new policy for classification of graduate courses... with indicators for productivity (number of papers), and quality (citation index). I am not against this at all, but as it was done, a sudden introduction of competitive assessment of professors and institutions, caused a distortion of the role of a

graduate program, either for professors and students. The main critic is that CAPES compares technical courses, disciplines and areas with non-technical... that make part together of the graduate program in Forestry... Like the lecture of economy compared with the engineering... and this directly... without any leverage or consideration of the many differences in relation to the structure of the knowledge, culture of each field, academic timing etc. **In our program we have five areas, each one of them with different dynamics.**
- I prefer to publish in co-authorship, **specially with students I am advising**... it is more convenient.. a great part of the work is done by students, and I come with a qualification of the content... (2nd Interview, Joao G.)

- I am obliged to publish to maintain my status as professor in the graduate program, and because I am scholar at CnPq where I have to have a certain productivity. **It is an obligation**... Although I have no obsession to publish a specific number of texts... traditional and well ranked publications are a filter of quality to articles and texts... **they are a test of quality**... Before, a researcher that wrote one article per year had a good productivity... today, **because of the competitive edge based on the ranking system, you must submit one text per month**.... and you have to consider the buffer time between the submission and the publication of an article... some journals published an article two years after its submission... the importance of publishing to my career comes from these **mandatory requirements**...
- "But I know that many people focus their production only in the quantity (bureaucratic requirement) disregarding the quality... (3rd Interview, Daniela B.)

- He has a working paper about authorship of texts that is presented to every new student or member of the staff of his lab (LAMEF).
- I am critic of the "publish or perish" trend. First it prompts plagiarism, or even worse the "self-plagiarism", when a scientist takes one information or data and presents it in different formats or structure aiming to increase his publishing records. It is a process, but at the moment **we are too much focused in quantity, due to the QUALIS index**...and it has different faces.. for instance, the main goal of the university must be teaching at first... research is a secondary function aiming to subsidy the academic formation.... on the other hand, the obligation to publish a certain quantity is promoting distortions on the production... for instance, to have a name on a paper today does not mean that you have written this text. There are cases of a research team from a Lab with 5 members. Each one of them writes a paper about different topics or theme, and in agreement adds the name of the others. In other words each one wrote one text, but officially they are considered to have written five. It is an **ethical aspect**, that we do not discuss nowadays. In other cases, authors of a paper just lend their name and prestige in order to improve the "visibility" of the work. And as you may know **the bad example permeates more than the good example**, in the sense that the people usually take the easier way, even if it might be wrong. There is a kind of **trivialization of the unethical behaviour** inspired specially by the political spectrum in our country. I don't know the extent of this problem, but I know that it is happening... motivated mainly by the trivialization and impunity...
- Books are the second form of disclosure of his work, and conferences and speeches as well... "But I admit that I am not an expert in communication... The site of our lab is since 4 years under construction, it is a weak side of me, since I was not raised in the modern culture of digital technology.
- But I don't publish because I want, I publish because as a professor of the graduate program I am obliged to publish... and **strangely enough the fact of publishing or not has no direct relation to the reputation of a scientist in his field.** Some professors and researchers do not publish but are very sought to present their knowledge in conferences or as consultants. (4th. Interview, Antonio Higa)

- The publication of articles is very important to my career, since it is **the main indicator for tenure and promotion**... but in the praxis it does not cause any improvement in my conditions to work.. my salary does not increase or decrease, although there is certain belief that it attached a kind of status to it, but in fact **the publication of articles is only "institutionally important, but not personally**".
- I usually publish articles only with the students I advise or alone... this is in order to avoid a recent phenomenon in which you have eight, ten authors per article, and everyone knows that the first author is usually the real author, and the last is the adviser.. those in between are the Godfathers or just friends who did not really contribute to the article... and I want to avoid this kind of praxis.... then I am trying to publish at least one article written only by me every year... In Brazil there is currently a '**papermania**', where you see, for instance, three researchers co-authoring three papers together. But if ask one of them about the articles he wrote, he just knows about one... the other two he is not even aware of his co-authorship on them... this is **indeed a farse**, it is anti-ethical. What causes it is the pursuing of the indexes. (5th. Interview, Julio Arce)

- To publish is very important in order to enrich my knowledge through new contacts coming from my texts.. I saw no difference between co-authored and single-authored texts... regarding ranking... I personally prefer to publish with others, because of the exchange of perspectives and ideas...
- Nowadays in Brazil it is happening a kind of **"race to publish"**, a phenomenon coming from the American scholarship.. researchers are being forced to publish in order to attend administrative requirements (ranking, minimum number of articles per year)... But if you look into the history of science, many of the most important scientists had published very few texts, but with a **very high relevance and significance**. Today there is a competition regarding the number of articles published, and this affects greatly the quality of the content published.. today we publish like we eat an ice cream... I know researchers publishing 12, 15, 18 articles per year... It is impossible to publish such amount with good quality in my field.. **there is no time or resources allowing such productivity, in any country**... they are professionals of publishing, but they are not working as scientists any more, and consequently their work end up being irrelevant to the real advancement of science. (6th Interview, Ivan Crespo)

- Since I am already retired, there is no impact of publishing to my career.... **But it does have an impact to my ego, because I am known in the field**. I am a former director of this school, and I am still **motivated by recognition**. I am the oldest professor here and one of the oldest forest engineer of the country. I keep publishing because I want, but not for any pecuniary or competitive aspect.
- I don't know if vanity (recognition, status) plays a decisive role in the academic life, but it is a factor for sure...
- I am not aware of any differentiation between co-authored or single authored articles, in terms of its value for indexes or rankings. (7th. Interview, Sebastião Machado)

- Our publication of articles nowadays are due to the advisement of students on graduate level (Master and Dr.). We (professors) do not have time to dedicate only for researching and writing texts for journals... then **we use the students we advise for that**.
- There are the mandatory requirements from CAPES. Thus **to teach in a graduate course**, the professors have to publish a minimum nr. of articles per year. The same if you submit a project for **funding**, this is the main criteria (Nr. of articles published and their corresponding index). This produces naturally some flaws in the process, where a single article become three, or you have an article with ten authors, and even the publication of irrelevant information only in order to attend the requirements... It is **an industry of articles**, a scheme,

but these are the rules of the game... and **professors are adapting to that**. But in reality publication is not always important, specially outside the academia, where the publication of articles in many cases is not relevant at all.
- In my opinion **co-authored articles are in general better and more relevant, but I do not see any difference to my career**... (8th. Interview, Márcio Rocha)

- Internally we are demanded to publish.. if I want to be professor in the Graduate program **I must publish at least three articles year in well ranked publications.**.. but **I have persons that became collaborators through the publication of articles..**
- I see no difference between co-authored or single authored texts... partnership and collaboration in writing texts (co-authorship) is **inherent to the scientific enterprise.** (9th. Interview, Romano)

- 80% of what I produce is directed to publication. It has a direct impact on my structure of work (funding, scholarships, institutional infra-structure, promotion and tenure). But we are living nowadays in **a very individualistic era**. It is a **feudal-individuality** where quantity is dictating the norms, and defining who is receiving more incentive. What matters at most is the number... how many? (10th. Interview, Carlos Roberto Sanqueta)

- It is important due to the mandatory need to have a certain number of articles published per year in order **to be eligible to teach** in a graduate program as ours here. Also when you **apply for a grant or a project** funding the first criteria they look is your records of publications and the position of your institution on the ranking system, which is based also primarily in **the number of articles published per year in journals with high impact factors.**
- Co-authored articles have no difference from the point of view of the impact in my publishing records, but there is a difference **in terms of robustness and quality** in research works done by many scientists and institutions. (11th. Interview, Alexandre F. Tetto)

- It is fundamental. Not only for me, but also for the institution. Since we are mainly evaluated by the number of articles published in journals with a good impact factor in our field, **we are demanded to publish articles**. If we do not publish our work accordingly we can be excluded as teachers of the graduate program and the institution can loose position in the ranking, compromising our chances to receive funding for research projects. It is also important to mention that to be excluded of the graduate program means that I can not be adviser of students on master and doctor levels, what creates a chain process that makes my work as researcher much more difficult, since today graduate students are responsible for many tasks performed in research projects.
- I always publish articles together with other persons. **The research work nowadays is done to a great extent by the students**, I am mostly responsible for **guidance**, **review** and **insight**, but the hard work is usually done by graduate students. Therefore, I can not perceive any difference of impact to my career between articles written in co-authorship and those I eventually may write alone.
- Usually in our field we publish the minimum required (3 articles per year). Rarely you will find someone here publishing more than 5 articles per year. And it is not rare that these cases are indeed a matter of the so called **"self-plagiarism"**. The same research, the same data, the same information presented in different ways to different publications. (12th. Interview, Antonio Carlos Nogueira)

- Today most of press publications have also a virtual copy or page. I prefer to publish on print based publication because they are still having a more credible basis for scientific information. **Internet sites have for sure a better way to manage information, but it makes also easier to falsify or simply copy the work of others.**
- It is a need, a must. The current system of academic evaluation (Capes) turned us into

slaves. Often we are obliged to publish any stuff just in order to reach a certain number of publications per year. And not seldom, we have to split the material we have, that could be used in one single good article, and publish it in many pieces just to attend a bureaucratic demand. **Publish is not the goal of a scientific career**. It can not be. A scientist pursues **to discover, to learn, to reveal**. And once he gets that, then it is time to publish. Today we are obliged to generate numbers, without caring much about the relevance or importance of the content related to these numbers. This, in my point of view, **discourage an academic to dedicate his time to pursue the advancement of science**. (13th. Interview, Nilton José de Sousa)

- If I publish articles on certain journals, it improves my classification on the Data Capes, and this means that I get a better position on the ranking of national researchers, and this increases my chances to access funding for research projects and so on. Also, if I publish at least three articles per year, then I can teach in the graduate program, and this is a less hard work, since in **the graduate program you have smaller classes with fewer students that are also not only students, but a graduate student is an assistant of his teacher as well**. He helps you in many things. (14th. Interview, Rui A. Maggi)

- It is important to the extent that according to your publishing records you get promoted, what we here call **progression (progressao da carreira)**. It is when you improve the conditions of your work (position, resources, salary etc). For instance, if you do not publish, or you publish too few works in a year you loose the right to have graduate student under your guidance, consequently you have less support to publish, since it is common nowadays that **graduate students are those responsible for the hard work on a scientific article.** (15th. Interview, Nelson Carlos Rosot)

- It is the most important thing. **Currently it is practically the only mean of evaluation of our work.** Formerly there were other forms of assessment, but today publishing in journals is not exclusive, but due to its weight to the curriculum it has become a mandatory requirement to any academic intending to teach in a graduate program.(16th. Interview, Sylvio Pellico)

- It is all. Because nowadays if don't publish articles you have no chance to ascend in your career, including the impossibility to teach in a graduate program. Also, you have no access to most of the grants and funding programs offered etc. It is the major way of assessment of your career.
- In that regard, there is no differentiation between single authored or co-authored texts. Of course to be the main author of an article is more important, but **the current form of assessment does not take that effectively into consideration**. What is important is to publish, does not matter if the article is co-authored or single authored. (17th. Interview, Setsuo Iwakiri)

- There are some **contradictions in our current publishing culture**. While the publication of books, for instance, does not have any value to our career as professors on a graduate program, it is the best way to communicate our knowledge in a structured and organized form to our students. Another contradiction is that our main routine is related to teaching activities. The work of research, and therefore publishing, is a secondary, although it became the main parameter to evaluate our performance. Though most of my articles (70-80%) are written by students under my supervision. It means, **without the students my output would be of max. two articles per year.**
- Our work is mainly regional. Thus, there is not so much sense in publishing nationally or internationally.
- Currently, the main contribution is to my motivation, since I am almost retiring. **It is an activity that is still making me feel needed here.** At the end, **publishing is a kind of test**

about what you think you know. It is a challenge to an old fellow like me. (18th. Interview, Franklin Galvão)

- I need to increase my production of articles. And it is fundamental to publish articles in order to get accredited to teach in graduate programs. This is the main rule here in Brazil. And it is also a matter of keeping me updated on the innovations in my field. Since it is **a chain process**: if you do not publish, you can not teach, and you naturally reduce your contact with the academic environment (other researches) as a whole. And this compel us to publish nowadays.
- There is a difference between co-authored and single authored texts, but currently is almost impossible to write any article alone. In my work I always need some body to help in field work. (19th. Interview, Christel Lingnau)

- Publications on well ranked journals are the main form to evaluate/assess our academic work.
- There are some differences between co-authored and single-authored texts, but they are not relevant... at least I do not give importance to it... **the most important criteria is the kind of publication you choose to submit the paper**...(20th. Interview, Vitor A. Hoeflich)

- It is vital. **The publication is the only way to show what you have done, and at the same time what keeps you updated.**
- From the point of view of the value of the work, I see no difference between co-authored or single-authored texts... But also to have more persons working with you on a single text is still a complicated matter, since the common is that most of the members of a group working together on a single article don't share the same interest and compromise as the main author. Who writes, usually, has a special interest in doing so. The **others add some support, or simply lend the name to the article in exchange for some benefit** that in many cases has nothing to do with the matter of the article.
- However, **all my publications are done in co-authorship**...(21st. Interview, José Guilherme Prata)

- It is very important to my knowledge actualization, to keep me updated in the field... since **all articles are written with graduate students**, and they bring always new information with their research and dissertation efforts.... On the other hand, I don't see a difference in quality... **the article is done to attend my needs as a professor (intellectual and bureaucratic)** and to attend the needs of the students to learn... but I don't see any difference on value or quality between co-authored or single authored articles...(22nd. Interview, Nivaldo Rizzi)

- Today I do not write any article any more. My students do this, and I, as adviser, get my name on publications as co-author... Therefore, **I am not aware of the importance of publishing to my career**... I do this for my students... Since I am retired, I do not make calculations in that regard any more... **The only thing I am still caring about is about quality, if the article does not have quality I take my name off it**...(23rd. Interview, Yoshiko Saito Kuniyoshi)

- Long time I do not publish an article as main author... all my publications nowadays are done as co-author with my graduate students. I do not care any more. Even my curriculum at the Lattes program is not updated... I put there only the number of works they require...(24th. Interview, Carlos Velozzo Roderjan)

- It is actually **the showcase of our work.**.. the publication represents your knowledge level, how much you have advanced, what is your expertise etc... weirdly enough this is officially recognized only for publication on journals and specialized magazines... for the work you have presented in congress, or contributions for books and other layman publications there is

almost no incentive, no compensation... **it is as they were not important for the advancement of science.**
- For example, most of professors today have a scholarship from CnPQ, and this kind of scholarship considers almost exclusively the number of articles you published in well ranked journals and publications. **I have five books published, for instance, and these books add almost nothing to my evaluation by CnPQ.**..(25th Interview, Antônio Carlos Batista)

- It is fundamental... **we are demanded to publish**.. in order to teach in a graduate program we have to publish a minimal number of articles per year... it is a mandatory requirement... which is related to an assessment system that analyze your productivity according to your quantitative output (productivity index).... I was recently excluded from the program because I did not achieve the minimum required for a professor of a graduate program... **If the coordination of the program do not follow this standard, the entire program looses score in the ranking.**.. and this reflects on the number of scholarships, funding and other resource investments... it becomes a cascading effect...
- To write an article alone is an obsolete practice... it is incoherent, no one works alone nowadays... and for the better of science it is better to attract more people to this activity... **the only difference is that if you are the main author, or a co-author of an article**...(26th. Interview, Ricardo Jorge Klitzke)

- It is the main way of assessing programs, projects etc. Therefore **it is the most important criteria to career progression**...(27th. Interview, Anselmo Chaves Neto)

- As I am still doing my doctorate, most of my students prefer to publish something with other professors that already have the title... as a matter of better grade for the ranking...
- **It is important to publish, but not that important**... my work here is mainly to teach, to research and to do extension outside the university... I am more focused on having a good name in the field of forestry, including companies, governments agencies and professionals... (28th. Interview, Renato)

-Today it is important if you want to teach in the graduate program, but my main task is to teach, rather than research... **I publish just in order to attend the bureaucratic requirement of a minimal number of articles published per year**... it means, I do not receive any reward, besides the allowance to teach graduate students, no extra recognition much less pecuniary compensation for any research or publishing effort...
- All my articles were done in co-authorship... I do not see any difference between single authored and co-authored texts, only that **working with other people is easier in the sense of sharing the research and writing effort.**...(29th. Interview, Ricardo Anselmo Malinovski)

- It is very important to publish, specially in order **to share the knowledge we are producing here**... but I dislike the current system, where you are obliged to publish as much as possible as a competitive manner of assessing our work... it is a **careerism** component, that is not adding any real progress to our knowledge... **Most of professors here, like me, publish only to be allowed to teach in the graduate program, and not because they want to communicate something they discovered.**..
- I see no difference on value between co-authored and single authored texts...(30th. Interview, Carlos Eduardo Camargo de Albuquerque)

- **I am still doing a lot of research. But for my self, not for the university**. I am very disappointed the way research work is managed inside the campus. We get no support, neither administrative nor financial. This is the main reason our research inside the university is still lacking greatly innovative discoveries. **Researchers do research here only in order to attend the requirements of the institution, not because they want to understand something or find a solution to a certain problem**. Why should anyone sacrifice time and

energy if at the end you get no award or recognition for your effort.
- Few years ago, I invented a new product to be used on medical applications. Since the university do not care and do not offer proper incentives, I registered a patent for myself, and latter on opened a company to explore and commercialize the new product. Since then all research I do is related to my own company. This is why I am not interested in the conventional academic publishing. **I stopped even reading the articles published on journals of our field, since I know that they do not cover the most advanced knowledge, and therefore do no present any innovation or discovery.**
- My academic career nowadays is exclusively related to teaching. Research I am still doing, but outside the university. **I am not interested in progression of my career inside the university.** (31st. Interview, João Carlos Moreschi)

- I was excluded from the graduate program because I had some political disputes with other professors... I criticize one of the projects they were doing here... therefore I am doing independent researches... basically developing software of forestry modeling...
- Today all articles are published with more than one author... single authored articles are rare, I would say impossible in the current context...
- CPPD **punctuation is decisive to my career progression**... therefore it is fundamental to publish...(32nd. Interview, William)

- Nowadays all professors /researchers must publish, or you can not work on a graduate program. **The system is very rigorous regarding publishing**.
- Always in co-authorship, usually with my graduate students. Very rare you prepare an article alone nowadays. **I do not perceive a difference on value of a co-authored in comparison with a single authored paper**. (33rd Interview, Afonso Figueredo Filho)

- It is important as **the main criteria** to be admitted as a professor on the graduate program. But it is also a way to attract public attention for your work... to make the work you have done available for the academic community.(34th. Interview, Simone Morrone)

- For me in my current situation to publish scientific texts does not add anything to my academic career... I am about to retire, and I already reached the top of my career progression as professor...**At this point, what could improve my situation would be to engage in administrative positions, which depending on the level, could give me an upgrade in my salary.**..
- Academically, **I prefer to teach on the under-graduate program**, it is more fun and challenging... and I also have the feeling that I am contributing more teaching under-graduate students, since the research properly has a formal and bureaucratic character... **at least half of the research published in my field (Forest Economy) is absolutely worthless, it is done exclusively with the goal to attend administrative requirements**... it is not only about students, professors have also to publish a certain number of articles per year in order to ascend in the career... it is indeed related only to the number of articles, with no regard to the quality of information or knowledge generated in the research... **the quality in our academic context is based upon numbers**...(35th. Interview, Ricardo Berger)

- **To write articles is the retribution of the researcher to society**...
- I am retired since 15 years, and I am still working as a senior professor... I have currently 8 graduate students under my supervision...
- 80% of the thesis and dissertations done nowadays are not offering any new knowledge... just to reproduce the methodology from another colleague or institution is not to produce new knowledge...
- **Master and Doctor courses are to produce manpower**... they can dominate a certain knowledge, but to be a professor it is not enough... **to be a professor, a person has to have**

written a good didactic book on the subject he is expected to teach... **it is a matter of credibility**... this should be the main form to evaluate his productivity... What happened here in Brazil is that to attend certain international demands or trends, we start to evaluate professors and researchers with **one single parameter: the production of papers**. Therefore what should be done is to differentiate professors from graduate students, and researchers... professors should be evaluated by his pedagogic skills, and one of the best manners to do that is to publish didactic books. This should be the main criteria for professors...(36th Interview, Roberto T. Hosokawa)

- Publishing currently works mainly as **a marketing promotion mechanism about the services my company offers**.
- There is no difference in value between single authored or co-authored. (37th. Interview, Ivan Tomaselli)

- As researcher, **what I really appreciate is to take part in Congresses and Conferences.** They offer a more dynamic communication of scientific investigations and the direct contact with colleagues motivate and enrich the information exchange that are decisive to the evolving process of research work. On the other hand, we see currently the discrepancy that **participation in congresses do not add any point to your career evaluation**.
- Our current system of assessment prioritizes other interests rather than scientific advancement... **the most important thing to a researcher or professor is to get the punctuation he needs for many reasons (e.g. to career progression, to increase chances to get a funding for research approved, and to be accredited to teach on a graduate program)**... A professor to teach in our graduate program here, he needs 210 points... a publication on a Journal classified as A1 (only international ones) renders 100 points... but if you have difficulties to write in English, and therefore you can't publish in a A1 journal, **you have to publish here, what means to publish much more often**... and considering the infra-structure, resources etc, we are indeed in **a very imbalanced concurrence context with international research institutions**...(38th. Interview, Dimas Agostinho da Silva)

- I am about to retire, therefore I am not so worried about this trend of "publish or perish"... my focus lies currently somewhere else... My goal now is to stop working at the university and start working with audit on certification...
- **I am not motivated to stay at this academic environment, where we have all the time a pressure, a competition for space, power and a culture of vanity based on nothing really valuable**... I am not going to help the world working inside here... **It is a matter of structure, context and culture.**.. It was always like this, the difference is that when I was young I was used to think that I could have an influence and help to change this reality... **but now I do not believe in this any more**...(39th. Interview, Ghislaine Miranda Bonduelle)

- the publication of articles helps me updated to the last developments in my field... on the other hand, currently publishing is fundamental to maintain my status as researcher at the CNPq database, and my condition as professor of our graduate program...
- Weirdly enough, **I do not perceive a difference on assessment between single-authored and co-authored works**... (40th. Interview, Ronaldo Viana Soares)

- The current assessment model inverts the importance of professor's work and researcher's work... **I believe that the professor comes first, and the researcher after**... **the requirements of Capes are very confused in that regard, because they are assessing the research work of a professor, without any means to assess the professor's work properly**... in other words, they judge the professor according to his research work, what in many cases is absolutely unfair...
- **Currently, the production of academic articles do not represent anything to my**

career... of course, without them I would not be allowed to teach in the graduate program, but I mean that **these publications are not adding anything to my present knowledge, since they have e mere bureaucratic significance**... On the other hand, I do believe that a **truly scientific investigation** is fundamental to the construction of the general knowledge.... unfortunately, **the current evaluation system emptied the significance of the research output**... I am still learning nowadays thanks to the discussions and conversations I have with colleagues and students, many times informally. **It is very rare to see anything new and interesting published in journals**...(41st. Interview, Humberto Klock)

- It is the main form to evaluate my work... but **you also keep yourself updated while working on articles to be published**... therefore, publishing is an important component of the professor's work...
- **Diversity of ideas is the main value of a collective effort or work in scientific research**...
- The convenience between professors and students to publish articles is more a complicity, since they agree to work together not only regarding the topic, but also regarding the reasons and motivations to work together and perform certain task... It means, **the interests and values of professors and students determine the end quality of the work they are doing.**.. (42nd. Interview, Alessandro Camargo Angelo)

- What I think correct, is that we work on products... When I research I intend to discover or create a certain product... or in order to be used by a company or by the public... **at the Embrapa we are required to produce something valuable for society**... Therefore, publish is still the main way to make the results of your work available to the public, do not matter where you publish, since it depends on the thing (product) created and your personal goals regarding it... (43rd. Interview, Celso Garcia Auer)

- When I started to work as a professor, seven years ago, there was no requirement to demonstrate productivity (nr. of published articles)... two years after I started here they began to demand the minimum of published works and so on... immediately I was not allowed to advise students, since the number of articles I published was insufficient... **It took me three years until I could attend the minimum required**... and then I could advise graduate dissertations and thesis, and this activity gives a new push to the productivity factor, since **most of any professors articles are done by students he is advising**... it means, publishing happens as a result of an administrative requirement and from the advisement of thesis and dissertations... very rare professors publish articles as a result of their own research effort itself... it happens as **a side result of the learning activity**...(44th. Interview, Nelson Yoshihiro Nakajima)

- It is fundamental to publish, since I am researcher of CAPES, it means that more I publish, more support and recognition I receive...
- The difference of value is not relevant, the most important is that you divide the effort, and create a synergy that is beneficial for your own routine...
- ABOUT THE ASSESSMENT CRITERIA

Qualis is a system developed by CAPES to classify the academic journals that are significant for the Brazilian scientific publishing context. It is based on the ISI system (Web of Science) and uses almost exclusively quantitative criteria to create its indexes (impact factor) and rankings... **the Qualis does not have any mean to assess the text quality, the merit of the topic, much less the relevance of the information published for the advancement of science**... **At the end it overstates the importance of the international research over our national research effort, does not matter how good and important it is**.... The main criteria for the evaluation of professors and students is the publication of articles in indexed

journals. For professors, a second criteria is the number of students under advisement... Therefore, what is important to CAPES is that professors and students are publishing together, does not matter what and with which quality... **the number of publications speaks for itself**... For professors the main criteria is the "intellectual production" (40%), and in the Forestry certain characteristics of the field justify its own criteria. For instance, conferences and congresses are not considered exactly because, for the characteristics of the field, very close to industries and others direct economic interests, it means that if it would count anything we would experience a great amount of research initialized but never finished, just in order to present few results in conferences... on the other hand, for students the conferences are counted... it is different in Informatics, where congresses count for students and professors... **usually everyone tries to justify their own interests**...
- There is a policy of research at the UFPR, as at any other public university in Brazil, what is happening is that **the UFPR does not have properly a research policy for the Forestry Engineering**... one of the reasons refers to the nature of the field, much related to practical applications and in many cases working under the guidance (consultancy works) of the industry... **it is easier to work like that, without having to think about what solution for a problem of society we will investigate**... this is much harder work... there is also a issue of the vanity or power, where **certain professors control a whole sub-field in order to defend their own interests**...(45th. Interview, Graciela Ines Bolzon de Muniz)

IN-DEPTH QUESTION (Internet & Publishing Culture)

Are there certain journals in your field that count more for promotion and tenure? Therefore, what is your perception of the "open access" publishing phenomena? It offers extra incentives for collaboration via Internet? How? Have you published works under open access licensing? Why?

ANSWERS:

- **I don't know Open Access**....What is the "Open Access Movement"? How does it work?
- I don't think that it is a good idea to publish openly all of my works. It is too much exposure... It might create a confusion about quality and accuracy of a information or data. **We need a guaranty that this work I am having access has certain quality level**. For example, entered a virus in my computer, just because I had a private account and have forgot to change the password from time to time... **it is to say that to have things more open, also imply an increase in the risks**... Internet is very powerful, it can help, and it can harm... (1ST Interview, Marisa)

- I like Open Access as a kind of introductory way to publish... for beginners... **traditional journals are more discerning**... they have better and stabler criteria of quality... There are no incentive or support for improving academic communication... you are free... for good or bad... tudo fica a critério de cada um...
- I am structuring the page of a distance course we are preparing and also the page of our laboratory. **We are trying to create a new channel of spreading our academic material**... (2nd Interview, Joao G.)

- **My focus is the national journals, since they are more appropriate to my topics of interest (local and regional)**. The main reason is that according to the punctuation given by the number of articles a researcher can receive or not his credentials to teach in a graduate program, or even receive or not funding for a specific project.
- She does not know Open Access... " I received some times new international publications..

most of them got my name from congress I took part (I am in a phase of enjoying the life as well)... some invited me **to write articles in English... but this is very difficult**, since I have to send the article to a translator, which costs a lot for me (around 800 Reais)... afterwards, the publication usually tells me to send the article to a reviewer (Grammar and content), what costs once more the same amount, at the end **it is not a fair effort**, business to publish articles in this kind of new international publications (She is not sure if these are OA magazines or not).... **and this is a good case, because normally I have to pay per page I want to publish... and this cost is not included in the funding** I received to do a research... this is the reason I prefer to publish on national publications... but even here they are starting to charge (20 - 50 - 100) the publication according the number of pages... (e.g. The Revista Floresta charges 50 Reais per article). (3rd Interview, Daniela B.)

- **He is not aware and never published articles in Open Access publications**. (4th. Interview, Antonio Higa)

- I do not send my articles to everyone... I am not aware about Open Access publications in my field... **We are indeed coerced to publish in vehicles with good indexes** according to the QUALIS system adopted by CAPES, but I also publish my articles in smaller local media, since most of my studies relate to issues concerning the regional or local reality there.... I know that this does not serve for nothing to me or to the institution, since **these publications are not officially ranked,** however I believe **this is a kind of minimum of return from our work to society**. (5th. Interview, Julio Arce)

- **The option of print-based journals is related to the indexes value on academic ranking required by the graduate program**... otherwise, they would not have such importance.... therefore, the two main reasons for the option or usage of certain tools / services: **time and necessity**.
- I know the Open Access phenomenon, but I never published... I want to do this in the future... (6th. Interview, Ivan Crespo)
- **I only publish in well ranked publications**... **I am the editor of one of the most important journals in the forestry field in Brazil (Revista Floresta)**... Do not know the Open Access... never publish an OA article... (7th. Interview, Sebastião Machado)

- Yes, but only because of the CAPES requirement, which is attached to a ranking of publications... and this produces also **a devaluation of the importance of congresses and events for the communication framework of researchers in the field**... since congresses and seminars aren't counted as a mandatory requirement... It is in fact incoherent with the reality of the people and institutions doing research in the field...
- **There are many good publications (Open Access) that have no value for our academic career**... This system of evaluation is emptying our interest for discovery and innovation.. (8th. Interview, Márcio Rocha)

- Yes, there is different weight according to the publication... **because of the ranking I publish exclusively on well indexed journals and magazines**... if I publish in Open Access vehicles it is the same as wasting the article, since I can not submit the same text to different publications... there is also the issue of the audience, and I prefer to publish my texts in journals that I know are read by colleagues and people that might become collaborators in the future. (9th. Interview, Romano)

- We, as professors and researchers of a public institution, must follow the directives given by the government, in case represented by Capes. And therefore **we prefer to publish in traditional journals, according to the norms of Capes**. It means, other kinds of publications do not count, or count very little to the official evaluation ranking. In my own

case, I have more than 15 books published, but they do not have any significant impact to my academic career here inside of a federal university.
- The main problem of Open Access is the piracy. I have had some of mine text books copied and distributed illegally through the Internet.
- There is also an issue regarding visibility. **OA publications generally have a broader and wider audience. But this is still a hope to the future**.... Since there are missing the mechanisms to ensure **the quality and relevance** of the audience...(10th. Interview, Carlos Roberto Sanqueta)

- Never published any articles under Open Access licensing. The main magazines we target here make their articles available for free on the Internet, and they are **the most important publications to our career**.
- There is no Brazilian publication on the field of agriculture with the grade A. If any researcher want to publish his article in a journal with this impact factor, he has to try to do it in English or French. (11th. Interview, Alexandre F. Tetto)

- I never published any article under Open Access. My priority is to publish on journals that count to my academic career. (12th. Interview, Antonio Carlos Nogueira)

- I do know some Open Access publications, but I never published any article with them.
- Again, it is not a matter related to the academic career, but **it is due to a bureaucratic requirement imposed by our institutions as the main form of evaluation of our research work.** However, you never want to waste energy with a publication (e.g. Open Access one) that won't bring any results to your career. It is like a cake recipe, **if you don't follow it you waste your time and work**. It is frustrating.
- Let us take the example of our own publication here on the Cifloma (Revista Floresta). It was until last year a B4 publication. And it became this year a B2, because it was incorporated by certain data-base indexers (SCOPUS, Scielo, ISI). It means, the publication didn't change its quality, or didn't improve its content in any aspect. And **the criteria to be indexed by these data-bases has very little to do with its content quality**. For example, why we do not have our content in English? Or a minimum number of articles per year. And this for us does not make any sense, since we are in a Portuguese speaker country and quality can not be assessed by the quantity of texts or pages. (13th. Interview, Nilton José de Sousa)

- Scielo is an Open Access data base.
- Google Scholar is also an Open Access source to give you a first hand overview.
- I would publish all my ongoing works under Open Access, but my adviser told me to not do that. According to him a doctor dissertation has to be original, and if you publish parts of your work prior to your defense, it can compromise the originality of the work. **What indeed is more a myth than anything else**.
- If you publish an article in an indexed journal it gives you 15 points in the ranking, if you publish in a non-indexed publication (does not matter if it is the most important newspaper of the country) it gives you 2 points. But if you publish an article in an international journal, it gives you 20 points in the ranking.
- **I always give preference to publications that gives me more points in the ranking.** For example, here, to teach in the graduate program you have to have published three articles per year in indexed journals during the last two years. But another issue is the time between submission and publication of the article. I try to balance the both (position in the ranking and time of publication), because some time it takes so long (two years) to get an article published that it is better to send the text to a publication with less punctuation but that will release your article much earlier. (14th. Interview, Rui A. Maggi)

- It is also an issue to see what is the interest of a researcher /professor. If you want to take part in a concurrence for a better position, or in a bigger institution, then you must pursue to publish your articles in journals with an A1 or A2 classification. In our field, unfortunately, there is not a single publication in Brazil with this classification. It means, you have to search a publication on the international scenario. But in my case, **I don't want to take part in any concurrence, I am already on the top of my career**, then my intention when I search for a publication with an appropriate audience and that does not take too long between submission of the paper and its publication (some journals need at least one year). A publication that helps me to maintain **my records and my status as a professor of a graduate program**.
- I see no professional appeal on open-access publications. Many have no clear proceeding, without any editorial board. There is also **a belief associating such free and open publications to less credible works**. We are used to work on a more controlled process. Here in Brazil many smaller universities have implemented such publications, but I think they have a core problem of continuity. It is not easy to keep a publication running for a long period of time. (15th. Interview, Nelson Carlos Rosot)

- On the forestry field we have only six or seven publications with good quality in Brazil. And I submit my texts only to them. If the article is excellent, then I see if it can be submitted to an international publication with a better classification on the ranking of scientific journals. **I was already invited to publish in new online publications, but I went to check its "Qualis" index, and it was not good. And I don't want to waste my work with publications that are not well positioned in the Qualis.** It means, these publications do not count points to my academic curriculum / assessment.(16th. Interview, Sylvio Pellico)

- Yes, there are certain publications with a higher score in the "Qualis system", and those are preferred when submitting a paper for publication. Therefore **I never tried to publish any article under OA.** (17th. Interview, Setsuo Iwakiri)

- No. It is a very recent phenomena. But **it is an issue outside of our scope here. Since we are publishing to attend administrative requirements.** I never published any text in a journal with an impact factor A, but neither in a publication with a C impact factor. We have to balance our interest in sharing knowledge with the resources available, our time, and the institutional requirements. (18th. Interview, Franklin Galvão)

- Never published anything under Open Access. Here in Brazil, we are assessed by this "Qualis" index. **It is a dictatorship of indexes, since I am obliged to publish my work on publications that are endorsed by this index.** Otherwise, all my efforts to produce some new knowledge would not add any point to the requirements I have to follow in order to advance my career. I have myself a very interesting example on how contradictory this system can be. I work specifically on remote sensing and geological sciences. Therefore I know and have good relations with the staff of reputable publications on these fields. The problem for me, is that I am located on a department / Institute of agricultural sciences (Forestry). Thus, my publication of articles on journals and magazines outside the agricultural sciences field would have much less impact, or do not be considered for my classification under the Qualis index. On the other hand, publishing an article about the utmost technology of remote sensing, for instance, in a journal of forestry would have a very reduced visibility, since the readers of these journals do not know, or understand the topic properly. It is like **a hidden barrier to interdisciplinary.** (19th. Interview, Christel Lingnau)

- No, why should I give energy to something that would not count any point to the evaluation of my academic work? I mean, we choose the vehicles to publish according to their position in the ranking done by CAPES. **Thus it is natural that you choose only traditional**

publications, since their are the only ones that are considered by the organ responsible to assess your work. The form of evaluation at any academic institution determine the way they work. The workers follow these determinations... it is not a matter of individual choice, or desire.
- We have no time to search for alternatives... they must be given by the institution we work for... I hardly keep up dated even my page at the Curriculum Lattes. And it is a mandatory requirement. I do it twice in a year.(20th. Interview, Vitor A. Hoeflich)

- I publish exclusively on traditional journals and magazines. As the issue with the tools, it is a matter of habit and inertia... why should I change? What would be my benefit in doing so? (21st. Interview, José Guilherme Prata)

- I am critical to any publication ranking being used nowadays. First of all, **they do not represent our country's reality**. Even if you take a single area, avoiding the comparison among them, you will see that it is structured in a corporate way. The list QUALIS, for instance, in our field (agricultural sciences), you will find there publications with lower quality, in terms of content, but with a better position in the ranking. In my view some of reasons for this bias is that the most ranking systems are based on a calculation system (index) that **prioritizes data-bases conglomerates, and this is so because it is done by a private company**... it means, it is unavoidable to have there a **corporate bias**... the magazines on the CAPES data-base, for example, are indexed according to the ISI criteria, which is developed by a big private conglomerate. It is easy to see that if they do a business to it, they would inevitably manipulate their product in order to attend their interests.
- Other issue, is that we have very few publications with a significant position on rankings. **They do not represent the Brazilian scientific diversity, neither disseminates the research output according to the very different geographic regions of the country. These publications have as single function to evaluate, or attribute a value to the individual productivity of our scientists**.
- In my opinion, every graduate school or program should have a publication to disseminate the knowledge produced locally, contextualizing the research and serving as a bridge to other programs, institutions and regions. This would allow the establishment of other criteria of evaluation. For instance: the structure available, the strengths and weaknesses of each field of research, **the social value of research** etc. This would only work in a local system of evaluation. Today we have a domination system articulated on a global scale. It promotes the international perspective prevailing over the local interests.
- Another example: **the extra value given to bilingual publications**. This is clearly an imposition coming from outside, because what would be the interest of a researcher or a publication in publishing the results of a local research in another language than the local language? **It is an imposition from international index systems**. Also this aspect of having a ranking focused almost entirely on the individual productivity according to international criteria masks the importance of certain researches to the region where it occurs..(22nd. Interview, Nivaldo Rizzi)

- I never took in consideration the issue of rankings of publication, or indexes of impact... I always publish in order to get visibility, and of course according to the topic and the interest of the student we choose certain publications that count for our objectives. (23rd. Interview, Yoshiko Saito Kuniyoshi)

- **He does not know what is open access**... he is not aware of the difference between open and non-open vehicles...(24th. Interview, Carlos Velozzo Roderjan)

- **To publish articles in certain well known journals or magazines is a matter of reputation as well**... not only about the ranking or impact index... the credibility of certain

publications is also related to its historical level of quality, and you borrow this when publishing an article there. **This is the logic adopted by CAPES and CnPQ,** that you must publish texts in well established publications, with a consistent editorial board, in order to get a high value for your ranking records.
- Many new publications offer only digital version of their content... but the most traditional, and therefore better ranked journals are still offering either print press exemplars as online copies...
- The better ranked publications are in English... It is very difficult to publish in English... if I have to publish an article in an international journal I have to find a co-author that has English as the mother tongue... or I have to hire a translator, what is very expensive here in Brazil...
- **I have no idea how to publish anything under Open Access.**.. (25th Interview, Antônio Carlos Batista)

- I only published articles on traditional journals... the main reason is regarding the requirement that the article submitted must be unique **(uniqueness)**... it means if I publish it in a magazine or journal that is not going to give me a good score to my official evaluation, than it means that I've waste part of my work, and now I have to produce more in order to achieve the score required.
- I could, for instance, publish on open access a summary or a review of a research work, but this would in any way require more effort from my side, without giving me anything in return... maybe a **better visibility to my work, but this is not guaranteed, neither rewarded.**.. (26th. Interview, Ricardo Jorge Klitzke)

- I heard about OA, but I never tried it... **I prefer to direct my efforts to traditional publications, since their readers are a more qualified audience and they render a better grade to my academic evaluation**...(27th. Interview, Anselmo Chaves Neto)

- **I am not focused only on academic performance**... I am publishing in journals that have not the better qualification in the index (Qualis), but that take less time between submission and publication...however, I never published OA because usually in our field these publications do not count any point to our evaluation, and I have to maximize my efforts... (28th. Interview, Renato)

- **We naturally try to publish in well ranked publications, although the barriers present in the most relevant publications in our field**... in general they operate like closed societies, where just the quality of the content do not guarantee the acceptance and publication... you must also have good contacts, and bee insistent... it is like a competition game for publishing...
- I never published open-access... I am not aware of any journal of this kind in our field... (29th. Interview, Ricardo Anselmo Malinovski)

- I never published OA... only in traditional publications.(30th. Interview, Carlos Eduardo Camargo de Albuquerque)

- On the private sphere the disclosure and propagation of knowledge works in a different manner, than journals and expert publications. The goal is at the end to have something you can make profit. Therefore, patents are the first step to achieve this goal. You publish only after the product is already on the market, or about to come out. It is a different procedure. Of course, I am still publishing in co-authorship with my students. But **I do not get involved in where they publish and so on. I simply don't care**.
- What I perceive nowadays is that most of my students and colleagues are publishing on traditional and well ranked journals in order to attend the demands from CAPES, and this

works against the pure scientific goals. **This explains the poor quality, in terms of significance, relevance and specially innovation, of the content of most traditional publications in our field**. They are publishing because they have to in order to advance in the career, and not because they think they have something valuable to communicate. **It is indeed a huge waste of time, from the scientific point of view.**
- I am thinking about publishing some of my commercial researches and discoveries, specially those that I could not find a way to put on the market, or that no company or institution demonstrate an interest, under OA, or for public domain. **But this is the last alternative**. While there is still having a chance to commercialize them, I will keep them with me. (31st. Interview, João Carlos Moreschi)

- I prefer to publish on well ranked publications due to the punctuation to my career progression
- I never published OA. But I want to make all my work available for public domain...(He does not comprehend the concept of Creative Commons licensing)...(32nd. Interview, William)

- The most important journals in our field need at least 6 months to give any feedback about a paper submitted to them. I am not referring to acceptance. Six months is the time needed only to say that the article was rejected, without explaining the reasons for the rejection. The review process though needs much longer. **Until two years**.
- I never published OA. **I have to maximize my effor**t in order to attend the requirements of the CAPES. If I ignore this rules I will have a low evaluation, which will affect directly my chances to receive support, funding, projects, scholarships etc... It is a competitive framework, where the OA publishing culture does not add any point to your score. (33rd Interview, Afonso Figueredo Filho)

- Never published OA. The main reason is the criterion of originality required by most of the well ranked publications. (34th. Interview, Simone Morrone)

- Yes, the main publication for us at the Cifloma is our own journal, the magazine Floresta, which is edited here by our foundation (Fupef)... as **a matter of convenience, complacency, or self indulgence**...
- Never published on alternative journals or other kinds of OA publications... because it would not count to my academic assessment... on the other hand it is simply convenient for us to publish here with the Revista Floresta... it is something that we perceive as some natural way, since **it is located at the same building we teach and do our investigations**...(35th. Interview, Ricardo Berger)

- **The current criteria for the assessment of journals is not reflecting the quality of research, specially in Brazil**... here what is ruling is simply a matter of convenience and exchange of favors...
- Researchers should not care about the grade or evaluation of a journal... their duty is to do good and relevant scientific investigations, and he should never be required to publish in certain, well qualified or ranked publication. If he publishes in his own weblog, this is his decision and he should not be punished neither rewarded for it...**the quality of the publication is not a proxy of the quality of research it is publishing**... **the progress of science must come first the progress of the career**...
- We have nowadays a bottle neck on each field because of the current system. With the most relevant works waiting years to be published, and this is only one of the bad effects of this publishing system.
- I never oriented my students to publish here or there... It is their interest... but professors here are requiring students to publish a certain number of articles, published in certain

publications in order to generate the points they (professors) need to be allowed to teach on the graduate program. **It is a pasteurization process**... it levels the research effort from the bottom...
- **The absurd of productivism**...(36th Interview, Roberto T. Hosokawa)

- My focus is not academic ranking, but **market visibility**... this is what makes a difference for me... therefore, I do not perceive difference between an OA or a non-OA publication... the main criteria is to see if it has an appropriate audience and scope to attend my needs of marketing...(37th. Interview, Ivan Tomaselli)

- Yes, there are the most significant journals, but this is merely a matter of career assessment and development, and **they do not really guarantee a greater visibility or broader distribution of the information**... I do not follow this, since I am already on the top of my career, but I have to confess that I am not aware of what publications are OA and what aren't....(38th. Interview, Dimas Agostinho da Silva)

- Usually any professor only publishes on well ranked journals... if he does not do this he is wasting his research effort, because publishing in any other publications, **including books, do not helps you to get the reward you need to go further with your effort**... (39th. Interview, Ghislaine Miranda Bonduelle)

- Well it is obvious that certain journals are more important to the academic career of any researcher nowadays... and I have a critical point of view regarding this... not only journals are important to the distribution of information and knowledge, there are books, for instance... **as there are conferences that are very important to the fast and efficient exchange of data, information and knowledge**... **they are simple a more agile option to inform and get feedback of your research**...(40th. Interview, Ronaldo Viana Soares)

- In forestry it depends on your focus... if you want to ascend internally here you have to publish in certain journals, but if you want to have more influence or to be known outside the university (e.g. among companies), then you must look for specific channels to achieve your goals...
- **Yes, I published OA already**...(41st. Interview, Humberto Klock)

- There is a flow of information that does not obey the conventional publishing criteria, according to indexes and rankings... **but this is more related to the communication of the academic public with the outside (external) world**...
- I advise 29 students... to receive scholarships they have to achieve specific indexes on productivity and performance... and therefore **I have to consent publishing in vehicles that attend their academic interests as well**, which are the most traditional publications (well ranked)...(42nd. Interview, Alessandro Camargo Angelo)

- This is another issue that **depends on the individual interest and on the characteristics of the work itself**... of course, this system of ranking is exacerbating the occurrence of a papermania, or of many kinds of bias on the academic publishing culture (e.g. **convenient co-authorship**), but in reality, you find also people going in a different direction, and doing good research and publishing the results in other kinds of publication than traditional well ranked journals... it is a fact that **ego and subjectivity are big components influencing the decision making process of scientists**, which is also defining and shaping behavior... in other words, to make the information free is not enough to motivate scientists to adopt OA vehicles... again it depends on the goals of the research or of the scientist...(43rd. Interview, Celso Garcia Auer)

- I did publish some articles on OA publications, but afterwards I discovered that these publications do not add any point to my curriculum index, then I stopped publishing there... with the current evaluation system if you do not seek publication on certain well ranked journals you end up wasting all work you have done, because it is not going to be considered for the progression of your career, which includes the chances to get projects funding and research scholarships...(44th. Interview, Nelson Yoshihiro Nakajima)

- The journals with a good Qualis are the only ones that I pay attention when publishing... **Open Access publications are still irrelevant for our work as professors here**...(45th. Interview, Graciela Ines Bolzon de Muniz)

8) How many academic articles do you usually write per year?

Number of articles or texts published in the last 12 months.

The question intended to reveal: - How active are the target group in producing texts?

Options	Respondants	%
None	1	2%
1 to 5	33	72%
6 to 10	10	22%
11 to 20	2	4%
More than 20	0	0%

Commentaries:

- Many of the interviewees admitted to publish only half of the written articles. "**It takes time to prepare a good article**".

- At least one of the interviewees declared that he did not publish any article last year because he is trying to complete his dissertation (doctorate, which in the Brazilian system is called "thesis").

9) From these, how many articles did you write in collaboration with other fellows?

Most approximate option...

The question intends to reveal: - How collaborative, regarding co-authorship, are the researchers when producing academic texts?

Options	Respondants	%
None	0	0%
Almost none	0	0%
Less than half	3	7%
More than half	2	4%
Almost all	9	20%
All	32	70%
Other	0	0%

Commentaries:
- Most of the interviewees said that their collaboration when writing scientific articles nowadays is usually done with students (doctorate and master). Very few works are pursued with other professors and researchers.

IN-DEPTH QUESTION (Individual Interests & motivations)

Therefore, what are the current motivations for you to write articles together (in collaboration) with other fellows? Some expected answers were:

* Decrease conflicts of interest
* To get it easier
* Expert knowledge interaction
* Improve carreer records
* Improve institutional ranking
* Improve the visibility of own work
* Access better funding opportunities etc

ANSWERS:
- **It is an exchange of favours (services, experiences or information)**. I write and someone revise... specially, in my case, when I want to publish articles in a foreign language... It is like a credit, that some day you may need in order to accomplish some task or goal. (1ST. Interview, Marisa)

- I write all my articles in co-authorship with students.. graduate and undergraduate... **this is a convenience relation**... (2nd. Interview, Joao G)

- CnPQ and CAPES value differently the single authored and co-authored texts.... **the main advantage of co-authorship is that you don't have to write the entire text alone**... and also the weight of a project done in partnership with other researchers and institutions... **however, in most of the cases it is a matter of formality, since at the end you just lend your name and prestige to others or vice-versa.... in practice there is no real collaboration... it is very rare.**
- Innovation is also a motivational factor to work with other persons and other institutions... experience exchange... but this is a theoretical ideal, in practice it is not so... **convenience is the main factor...**
- Almost all of my articles are written with my students... they are very good in investigating, but in the text they need more experience... here at the university there were already cases of judicial process disputing authorship of articles... **we lack more precise norms regarding this.... it is usually a personal and spontaneous process**... it depends on the interests of each part... (3rd. Interview, Daniela B.)

- All articles are written in co-authorship. It is always better to write an article in co-authorship... **this enrich the content, facilitates the construction of the argumentation, and makes easier to get a balanced text.**.. but of course there is a praxis in which researchers have an agreement to see each other as co-author, even when they write articles alone. This is in my opinion **an ethical flaw** of the current system... I am not aware if there is a different weight between single authored and co-authored texts. (4th. Interview, Antonio Higa)

- I seek collaborators who have more knowledge than me in certain topics... it is **to enrich the content**... it has nothing to do with the "obsession" for indexes or rankings.... but we are all aware that institutional collaboration **increases the chance for funding**, and we naturally search for partnerships with good chances to access resources, what afterwards tends to generate reports and papers of researchers from these institutions... (5th Interview, Julio Arce)

- Almost all my works are published in co-authorship.. I feel more comfortable sharing the responsibility of an intellectual effort with others (colleagues or students)... **this enriches the work quality**... (6th Interview, Ivan Crespo)

- I write all my texts together with colleagues and students... It is a matter of convenience, to have some one to share the toil, and also to help in the thinking process of an article preparation.... **work with more people definitely adds quality**... on the other hand **there is no clear support or policy regarding this**. (7th. Interview, Sebastião Machado)

- **Exchange of ideas**, interaction, new perspectives... (8th. Interview, Márcio Rocha)

- **Exchange of thought and new perspectives** from the same topic... (9th. Interview, Romano)

- I publish almost always in co-authorship, but **it is a matter of convenience** (specially with students), rather than a matter of any kind of incentive...(10th. Interview, Carlos Roberto Sanqueta)

- **To work with other persons enrich the work**. The exchange of ideas. One single point of view limits the work.
- On the other hand, there is a bias, **a lack of coherence happening due also to the need of publishing**. It usually happens when an article has many authors, but indeed only one wrote the text. The other authors are like figurative, due usually to **an exchange of favors**. It is a new problem, as the impact indexes are also a recent invention, as the technology that made this approach to data and information possible. (11th. Interview, Alexandre F. Tetto)

- We have adapted ourselves to the requirements of the institutions we work for, using the characteristics of our context to attend these demands. Since we have always to teach classes in parallel with research work, **we have tried to combine these two activities**. Today, **almost all my co-authors are my graduate students**, and I work with them because **it is convenient to me and it is convenient to them**. (12th. Interview, Antonio Carlos Nogueira)

- First of all, to write an article is one thing. To publish it is another. Not rare you write a text that will never be published. You can have a very productive year, where you write many articles, but unfortunately you don't get any of them published.
- Some people are extremely worried about being the first author of a publication. **The adviser, in some cases, requires to be the first author**. But in my case, I never note any difference of impact regarding this. I usually publish articles in co-authorship with my graduate students, or colleagues.
- Usually I publish articles in co-authorship with my graduate students, and **this is the main motivation for me**, besides the mandatory requirement to publish, since to write scientific texts is an important part of their instruction as researchers. (13th. Interview, Nilton José de Sousa)

- There is a difference in the impact factor of the article according to the number of authors. This factor is distributed among the authors, but **it gets multiplied by the number of citations**. **It makes a difference, but it is an irrelevant difference, since the main criteria is to publish, does not matter if alone or in co-authorship**. To get these points in the ranking is only motivation to write articles. **It is pure egoistically motivation**. (14th. Interview, Rui A. Maggi)

- It is a motivation in a sense that writing an article within a group, **distribute the effort**, reducing the amount of work for everyone. But there is no extra reward or differentiation in value to your promotion...(15th. Interview, Nelson Carlos Rosot)

- The main motivation is to take advance of the symbiosis between students and professors needs. Graduate students must learn how to research and write a paper about that, and professors must publish articles in order to keep their position as teachers in a graduate program. (16th. Interview, Sylvio Pellico)

- The important thing is to publish, thus to work together in an article is a way **to divide the effort** with someone else. (17th. Interview, Setsuo Iwakiri)

- **My main motivation is to see that I am still useful here**, specially for the students. It is also a challenge... this **role of guidance**, a role with many positive reward and satisfaction, although it sometimes also involves the risk of frustration. (18th. Interview, Franklin Galvão)

- **Convenience**... **shared work efforts**...(19th. Interview, Christel Lingnau)

- **I have commonly done the adaptation of dissertation into scientific papers**. I mean, we take a dissertation of a graduate student, summarize it, or some part of it, in order to build up a more concise and objective article to be submitted to publication. **It is a synergistic relation**. We help the graduate students to get their degree, and gather some experience within writing and publishing, and **they gave us the material needed to the institutional assessment we are obliged to follow**.
- Besides this **pragmatic aspect**, the main reason to write articles with someone is to pay respect and recognition to the effort of a student or a colleague. Also the **knowledge complementarity** is an issue. It means, to work with someone with an expertise that it is important to your analysis, but it is outside of your sources or field of work.(20th. Interview, Vitor A. Hoeflich)

- I learn a lot researching, preparing an article and publishing together with other persons... any comment, or contribution to an article makes you think about your perspective on the issue. **It induces you to challenge your own way of thinking**... especially regarding the interpretation of data and conclusion of the article..(21st. Interview, José Guilherme Prata)

- To disseminate and teach... publishing here is part of the learning process...(22nd. Interview, Nivaldo Rizzi)

- It is a part of the formation / education process... the students must learn how to write an article.(23rd. Interview, Yoshiko Saito Kuniyoshi)

- **My main goal in publishing is to register/record my work**. And therefore to share the information I am working with. Whether these information is useful or is used by somebody else or not, it is also important, but it is not up to me to decide such thing, and I think I should not guide my work according to the audience expectation... My whole life goes like this, **I never planned to achieve certain point, or to get certain job, or to be rewarded for my efforts... things just naturally happened, almost without any planning action in that regard... I am a lucky guy**...
- I see no difference on publishing co-authorship or single authored articles... On the other hand, nowadays **to publish articles with students is one of the activities where I get most satisfied at work... I really love this kind of interaction...**
- Unfortunately the evaluation model of our educational institutions nowadays (CNPq) is exclusively based on quantity, not quality...and this creates the absurd of having several **publications without relevant content**... **such system praises people without any talent or interest in working for the progress of science or for the general well being**. (24th. Interview, Carlos Velozzo Roderjan)

- **Research is itself a motivation**... research is how professors learn further, develop themselves as workers of the knowledge... **research is the motor, that keeps you updated and motivate you to learn further**... in this context, **interaction is a main reason to work together**.. and nowadays it is much harder to work alone... you need different kinds of professionals (expert in statistics, in field research, in intellectual thinking etc)... **in general to work in a team is better because you can then dilute the effort needed**...(25th Interview, Antônio Carlos Batista)

- **Besides the mandatory requirement**, to give to students an opportunity to know the field and to learn how to take part in the production of knowledge...(26th. Interview, Ricardo Jorge Klitzke)

- I write all articles with other persons... I see no difference between single-authored and co-authored texts from the point of view of weigh to the academic evaluation... it is simply a matter of convenience, since writing articles with other people spares me time, and energy... **it shares the effort**...(27th. Interview, Anselmo Chaves Neto)

- It is part of my work to teach how to write scientific articles to my graduate students, **and working together I also spare some effort and time**...(28th. Interview, Renato)

- **To divide the effort**...(29th. Interview, Ricardo Anselmo Malinovski)

- For me the difference between single authored and co- authored is that **working with other persons means less work for everyone**, I mean the effort is divided... also, preparing articles together with colleagues and students enrich the content... two heads think better than one... (30th. Interview, Carlos Eduardo Camargo de Albuquerque)

- **I am doing it only to help my students and colleagues**... but usually, in my point of view, people work with others in order to divide the effort... **very seldom they do anything together in order to improve the knowledge generated, in order to improve the results of analyses and examinations, interpretations etc**. **The scientific culture is characterized by a high level of competition, what combined with vanity and individualism, creates an atmosphere where mistrust reigns.** People very usually want to use what you know, what you can do, but they are not interested in a truly knowledge sharing process. (31st. Interview, João Carlos Moreschi)

- **To improve the quality of the content and divide the work effort**... I need the data of other people, since my expertise is data processing and analysis...(32nd. Interview, William)

- A common phenomenon here is that professors do not have time to conduct any research by themselves. We all here are overwhelmed with many tasks, from teaching to administrative positions in many cases (Labs, projects, programs etc). **Professors need the students to do the investigations, and this is the most common collaboration on writing of articles and papers occurring here**. **Currently the students are the main up dater of professors.** They bring the state of art on tools and data available to us.
- But to work together with someone there is also a personal factor. **Convenience**, when publishing with students, but it is a matter of personal tune, empathy. You do not publish anything with someone you do not have a good relation. Therefore, **it is also a matter of personal choice**. (33rd Interview, Afonso Figueredo Filho)

- The work flows faster if divided with other fellows... it means that **you have better chances to publish often**...
- I already published articles that I wrote alone, but for **a matter of convenience (people who**

sent me their data, for instance) I added other co-authors to my paper. (34th. Interview, Simone Morrone)

- In group is always much better, specially regarding **the exchange of ideas**... the quality of information is surely better, since there were more critical views reviewing the text, or even searching for data or information and arguments...
- Of course, we are aware about the **anomalies**, like when you have 10 co-authors or more in one single paper... it is for us clear that the case is an exchange of conveniences or exchange of favors, and not exchange of ideas...(35th. Interview, Ricardo Berger)

- I love to advise students... I learn a lot with them...(36th Interview, Roberto T. Hosokawa)

- The **exchange of ideas** and the **learning process** becomes more dynamic and effective with more people working together...(37th. Interview, Ivan Tomaselli)

- The **exchange of ideas** and the **learning process**...(38th. Interview, Dimas Agostinho da Silva)

- Since 5 years I publish articles in co-authorship with prof. Setsuo... and he takes care of format and submission rules of these articles... it is a partnership of **shared effort**...
- **Ideally the most important motivation is the exchange of ideas**... to learn, to discover something new.. it is easy to learn new things when you are working with other persons. (39th. Interview, Ghislaine Miranda Bonduelle)

- When you work together with other people it is natural to have in such work **a broader coverage of the topic studied**... it is simply natural to have more perspectives involved... it is more efficient from the point of view of the analysis itself...(40th. Interview, Ronaldo Viana Soares)

- To learn from **different perspectives, to share ideas**, to improve the quality of the analysis and discussions...(41st. Interview, Humberto Klock)

- **Diversity of ideas is the main motivation to work with someone in scientific research**... But, I identify a trend to eliminate single authored texts... for different reasons, like the increase of research methods complexity, or the need of interdisciplinary approach and effort, or simply for **a matter of efficiency and productivity**...
- But we might not ignore **the social importance of research**, which is more an ideological aspect that is very efficient to bring people together in a jointly effort to produce something... organization and summarizing of a certain collective effort... It means, the article is a proxy of this effort that intend to attend certain demand (e.g. solution for a problem)...(42nd. Interview, Alessandro Camargo Angelo)

- In principle, **more people add value to the effort made on a research,** specially in cases of multidisciplinary or interdisciplinary investigations... it **permits optimization of resources**, **knowledge and energy/intellectual effort**... of course, taking into consideration our current context (cultural, institutional and economic), a mandatory requirement to publish a certain number of articles per year, ends up promoting a bias, where you will always see as legitimate to put personal or institutional conveniences before the scientific goal, or to make you to ignore the social importance of your own work, since you are directed to focus (by the context, social and institutional) on your individual interests first...
- the causes of such bias are therefore **a mixture of individual interests with the characteristics and goals of the research** itself..(43rd. Interview, Celso Garcia Auer)

- **Interaction is the main reason**, since more people help in the process of information/data collection, analysis and writing... which also contributes to a more efficient work with the division of tasks... and of course if you can have the collaboration of a prominent researcher,

that is going to help to give more visibility to your work... I do not see any further advance, of ranking value, for instance, between co-authored or single-authored...
- Before this mandatory requirement, I published in order to disseminate the information... nowadays, with this requirement of compulsory publishing, **I do it firstly in order to attend the administrative requirement,** or I will loose the right to teach in the graduate program... (44th. Interview, Nelson Yoshihiro Nakajima)

- **to divide the work effort**...(45th. Interview, Graciela Ines Bolzon de Muniz)

10) How big is your academic network of collaborators / co-authors?

Estimation of the number of co-authors on any academic text last year...
The question intended to answer: - How big is their research network indeed? Is there any clear pattern of network size in the target group?

Options	Respondants	%
1 up to 3 fellows	4	9%
4 up to 10 fellows	28	61%
11 up to 20 fellows	7	15%
More than 20 fellows	7	15%
I don't know	0	0%
Other	0	0%

11) What tools / procedures do you usually apply to perform collective writing / co-authoring?

Up to 03 (tree) most applied options... People may select more than one checkbox, so percentages may add up to more than 100%.
The question intends to indicate: - What are the most important / used form / tools for co-authoring texts? - How known / used is the "Online tool for creating and sharing content/ Google Docs"? - Is it possible to draw a comparative analysis between conventional communication and online systems, in terms of their importance and relevance for co-authoring?

Options	Respondants	%
Word documents via E-mail	45	98%
Public discussion forums (e.g. Yahoo lists)	0	0%
Intranet platforms (e.g. Moodle / Blackboard)	1	2%
Online tool for creating and sharing content (e.g. Google Docs, Office 365)	4	9%
Wiki-page (e.g. Wikiversity)	0	0%
Weblog (e.g. Foresttalk)	0	0%
Institutional repository (e.g. Banco de teses e dissertacões-UFPR)	0	0%
Online publication (e.g. Revista Floresta, Open Journal Systems)	2	4%
Other	10	22%

Commentaries:

- Some of the interviewees declared to use tools like Dropbox, MegaShare or even a pendrive when dealing with big files, with many graphics and drawings.

- The Skype is basically applied for discussion about the content under construction.

- **The "online copy" of the work serves only for the review process and submission of the articles.**

- Many of the interviewees declared to use OpenOffice as the main tool for writing.

IN-DEPTH QUESTION (Institutional Policy)

Do you have any offer from your department of courses, upgrades, actualization etc, of new tools for academic networking, research collaboration or co-authoring? Please specify when, what, how, and comment the results and benefits.... Are there institutional incentives to try out alternative tools / methods?

ANSWERS:

- She uses word for writing texts... repeating: **The university is like a mother, it offers all support to keep its staff up to dated. You don't actualize your self if you don't want?**
- But there is no specific policy to direct or incentive the use of new tools for certain applications... Who wants things like these must go for your self after the opportunities... (1st. Interview, Marisa)

- No, you are absolutely free to choose how and with who you may work... (2nd Interview, Joao G)

- The university offers basic courses of basic tools that usually we already have learned by our own... **in therms of communication policy the university is a desert...**
- I check my state of knowledge usually in congresses and events... it is a kind of fever thermometer...
- The Curriculo Lates offers also a parameter to our work flow, presenting graphics about the communication forms and disclosure of our research work, and the characteristics of our network of collaborators (e.g. the most often co-authors). It helps to visualize a good balance in the mix between events, publications and partners. (3rd. Interview, Daniela B.)
- Do not receive any institutional offer to try out new communication tools... (4th. Interview, Antonio Higa)
- No.. we are free... **the good tools are those that we have and use.**.. (5th, Interview, Julio Arce)

- **There was never been a project, initiative or action by the institution regarding communication tools or procedures**... And this gives the impression that they (administration) are satisfied with the way the scientific communication is being done.... (6th., Ivan Crespo)

- There is no offer from the administration to try out different tools...(7th. Interview, Sebastião Machado)

- They (institutions) offer, but it is not mandatory, and there is a lack of a policy in that regard, together with an overload of work hours in class, administrative activities, academic orientation (graduate students)... **at the end there is no time for more improvement**... or

even a help, a really support in that regard could change the current situation... (8th. Interview, Márcio Rocha)

- No... (9th. Interview, Romano)

- There is no offer. **It is mainly an initiative of the researcher**, the institution although sharing the interest on the impact and visibility of the work, it transfers the responsibility of publication almost entirely to the authors. (10th. Interview, Carlos Roberto Sanqueta)

- No, communication is a matter mostly left to **the individual to decide** how to be done. We have **autonomy to choose the ways of communicating** your work. (11st. Interview, Alexandre F. Tetto)

- Almost nothing is offered by the institution regarding communication and collaboration.. (12nd. Interview, Antonio Carlos Nogueira)

- No, if there is I never noticed these offers. **It is also a matter of convenience and inertia**. (13rd. Interview, Nilton José de Sousa)

- I use Google Docs (Drive), but seldom. Specially with colleagues from other institutions and departments. It was an initiative of a friend / colleague, not from the administration of our institution. But colleagues here resist to use the Google Docs, they are still preferring to use E-mails.
- **There is no offer from the institution regarding the improvement of our tools and methods of communication**. In some international universities, for instance, there are persons taking care of basic tasks of information management. In certain American libraries you do not need to always search for information yourself. There is a librarian there to support you in that task. It means, you don't have to be updated to the last technological advancements of scientific databases, some one do this for you with competence and thus you can dedicate this time to your scientific inquiry. I went once to the library and tried to suggest this new way of supporting us. The librarian turned to me and said: OK, I can do this for you, but it will have to charge you for that. And this inside of a public university. It means, the people working here are prompt to help you if they are rewarded, but there is **no institutional policy to improve certain tasks like the search and management of information**. Another example, nowadays we are very dependent on statistical calculations to the analysis of our research. There is a laboratory at the department of statistics dedicated to support other researchers in that regard. You have only to make an appointment and go there. The problem is that nobody knows that. **I think this is a result of a very inflexible structure.** (14th. Interview, Rui A. Maggi)

- No, from the institution never. We learn new things from our colleagues or friends. In terms of communication there is no interference of the institution regarding the tools we might use. Therefore, **we apply the tools we know and are used to apply**. (15th. Interview, Nelson Carlos Rosot)

- No, We search and find communication tools by ourselves...(16th. Interview, Sylvio Pellico)

- No...(17th. Interview, Setsuo Iwakiri)

- No, there is no incentive, or facilitation in that regard coming from our institution. **We keep ourselves minimally updated regarding technical improvements (e.g. iPad) thanks to the contacts with colleagues and students.** Because, we know that certain technological innovations facilitate our work in lectures and in research work, and **nobody wants to be left behind**. (18th. Interview, Franklin Galvão)

- No...(19th. Interview, Christel Lingnau)

- I learned about Moodle, for instance, in 2010, and it was through a distance course I had to teach... I don't remember of any official demand or requirement from the UFPR concerning this topic... **the initiative to try out new tools is always an effort by professors themselves**... But it is still, I do not work with Moodle yet, I just got to know it...(20th. Interview, Vitor A. Hoeflich)

- No offer from the institution. I use what is common and established among my fellows... (21st. Interview, José Guilherme Prata)

- No... (22nd. Interview, Nivaldo Rizzi)

- No, I never noticed that... there is of course the possibility to learn what you want through colleagues and students...(23rd. Interview, Yoshiko Saito Kuniyoshi)

- They may offer, but in my position today I have no interest...(24th. Interview, Carlos Velozzo Roderjan)

- I manage a page of our lab here.... I use it mainly for archiving articles, texts and content related to our research work... I use it as a repository for our research group...
- The university is a place where the autonomy, specially regarding communication, is the most fundamental law. No one ask you to use certain ways or tools, as well **there is not a single form to represent the knowledge and the information here produced**. **The university ask you to present results, but it does not determine how these results should be communicated.** The important thing is that the results may be effectively demonstrated. But this do not say if they must be presented online or in hard copies of books... **there is no policy, resolution or norm regarding the form of communication, or its ideological background... what is important is that you demonstrate the work you have done, but you decide the best way of doing it**...
- A recent change in our communication culture is definitely the introduction of online procedures... but **we are only starting this**... most of our bureaucratic and administrative procedures nowadays are obligatory done online... every submission of documents, papers, requirements etc.. everything must be done online, even if you are still keeping hard copies of these documents as measures of control...
- We are indeed in a transition phase... our staff is still mostly built with old fellows that didn't grow up with computers, mobile phones, iPads etc... at the same time, we have an entire new generation starting taking positions, becoming professors etc, and they are bringing **an entire new communication culture**.. I think it is inevitable a certain clash to occurs... And I cannot see any policy, or effort from the university's administration in order to conform and guide these transition... i**n bureaucracy and administration yes, but not regarding research and teaching**....
- There is no coercion in terms of effectiveness or regarding best practices in communication.... I think it is simply a default of the current academic context...
- I would also cite few initiatives on distance learning... they are starting, and therefore are still incipient... e.g. FAO Course on distance learning consumes two hours per week...(25th Interview, Antônio Carlos Batista)

- Yes, the university offers every course about any program or system you can imagine... but at the same time, it is done **on a volunteer basis**... you do only if you want... because no one here will require you to learn a new tool in order to communicate the results of your work in a better manner... **communication efficiency is not the priority here**...
- We have also to consider that my generation was not raised with computers... I learned a computer when I was a grown up already.. (26th. Interview, Ricardo Jorge Klitzke)

- No, what I know here is the logic of **"do it yourself"**, since it is your interest, your business to get recognition and reward for your work... (27th. Interview, Anselmo Chaves Neto)

- No, we have to search for new tools and methods by ourselves... it is part of our work as researchers... Even **the website of our graduate program should be much better designed and structured**... It should be a portal of reference in our field, with educational and research material for all students and interested... **Today it has only a bureaucratic and formal function**... it is not an efficient communication tool...(28th. Interview, Renato)

- No... We lack completely a policy regarding communication...(29th. Interview, Ricardo Anselmo Malinovski)

- No...(30th. Interview, Carlos Eduardo Camargo de Albuquerque)

- No, on the opposite. **The university discourages you to try any new approach towards communication of research work, or the research itself**.(31st. Interview, João Carlos Moreschi)

- No (32nd. Interview, William)

- No, so far I know. Maybe there are, but we are not aware about them.(33rd Interview, Afonso Figueredo Filho)

- If there is I am not aware...(34th. Interview, Simone Morrone)

- From the University or from the department, never... not that I remember...(35th. Interview, Ricardo Berger)

- No.. if I received I ignore...(36th Interview, Roberto T. Hosokawa)

- No, but **it would definitely change my habits if there was a policy regarding communication and information management**...(37th. Interview, Ivan Tomaselli)

- No... in general universities communicate very poorly... **there is an absolute lack of communication policy towards scientific advancement, or collaboration, or discovery**... The campus left this task to each researcher to decide **individually**...(38th. Interview, Dimas Agostinho da Silva)

- Sometimes they offer courses and tutorials regarding new programs and software, but these courses are poorly advertised... and the lack of any policy and requirement to improve our communication turns to feed our self-indulgence...(39th. Interview, Ghislaine Miranda Bonduelle)

- No, never...(40th. Interview, Ronaldo Viana Soares)

- He manages his classes through a platform developed on Joomla... but it was his own initiative together with other colleagues... there was no support of incentive by the UFPR to work with it...
- No, I never receive an offer to try out new communication tools... our university really misses this issue... **When we began to use computers internally, there was more attention regarding what and how professors were using communication technology, but this support seemed to be putted aside after a short while**... today the great majority is on its own regarding this issue.... **it seems clearly that communicate science effectively is not priority**...
- Among colleagues we talk about certain tools, new and old ones, but from the administration there is apparently no interest regarding this issue... (41st. Interview, Humberto Klock)

- Yes, but I believe they are poorly advertised... or the **people are simply not interested**, but periodically I see official offers for tutorials and seminars about new tools and technologies to be used on communication activities...(42nd. Interview, Alessandro Camargo Angelo)

- No, that I remember... they (university's administration) send E-mails about new tools and sources of information (e.g. Web of Science), but these events or announcements do not require attendance or do not reward participation in any form, which **empties the possibilities for adopting properly new practices and tools**... (43rd. Interview, Celso Garcia Auer)

- The university offers you the basic package of software (e.g.: Windows Office), and only recently they started to train the staff to work with digital technology for administrative purposes... it means, the platforms like Moodle or Joomla, which are used as Intranet for the management of the classes and seminars... Students, lectures material and examinations... but **this is very recent, from one year more or less**...
- I prefer to learn myself....(44th. Interview, Nelson Yoshihiro Nakajima)

- The university offers courses and support with any communication tool available... but **never as a directing effort, it is simply a support offer**...(45th. Interview, Graciela Ines Bolzon de Muniz)

12) Could you please indicate the relevance of the barriers listed below regarding collaboration / co-authorship on your scientific field...

The question intended to show: - What are the most relevant problems for co-authorship? - Is there any clear pattern regarding problems for writing papers in co-authorship?

- Unorganized information flow

Options	Respondants	%
Very relevant	15	33%
Relevant	19	41%
Less relevant	5	11%
Irrelevant / Not applicable	5	11%
I don't know	2	4%

- Data deluge / excess of information

Options	Respondants	%
Very relevant	11	24%
Relevant	12	26%
Less relevant	10	22%
Irrelevant / Not applicable	12	26%
I don't know	1	2%

- Online tools lack trustfull processes

Options	Respondants	%
Very relevant	4	9%
Relevant	10	22%

Less relevant	8	17%
Irrelevant / Not applicable	23	50%
I don't know	1	2%

- Bureaucratic requirements for research documentation

Options	**Respondants**	**%**
Very relevant	20	43%
Relevant	7	15%
Less relevant	15	33%
Irrelevant / Not applicable	3	7%
I don't know	1	2%

- Missing incentives towards collaborative research

Options	**Respondants**	**%**
Very relevant	15	33%
Relevant	16	35%
Less relevant	7	15%
Irrelevant / Not applicable	7	15%
I don't know	1	2%

- Trust and dialog are harder to be produced at virtual environments

Options	**Respondants**	**%**
Very relevant	8	17%
Relevant	11	24%
Less relevant	7	15%
Irrelevant / Not applicable	18	39%
I don't know	2	4%

- Spirit of concurrence at academic environments

Options	**Respondants**	**%**
Very relevant	14	30%
Relevant	5	11%
Less relevant	9	20%
Irrelevant / Not applicable	18	39%
I don't know	0	0%

Commentaries:

- The lack of resources in combination with other factors (e.g. bureaucracy) is seen as the biggest barrier for the further development of scientific collaboration /research. "**Bureaucracy creates its own life...**". “'Missing incentives' refers specially to

resources and policy". "At the end, the people here are managing their own interests". **(20th. Interview, Vitor A. Hoeflich)**

- Several declared that "Concurrence is an incentive!". However, few of the interviewees agreed that "it is fundamental to have limits to it".

- Others refer to the "Spirit of concurrence at academic environments" as a "rain of egos" (chuva de egos).

- Most of the staff hold Master, Doctorate or Post-Doc degrees from universities outside Brazil (Argentina, Australia, Canadá, Costa Rica, Finland, France, Germany, Japan, Spain, USA)...

- Several are working at the UFPR in a DE (Exclusive Dedication) regime, which means that he is not allowed to work (even partially) to any other institution... However, many of them are constantly involved in consultancy projects (through partnerships of the University with other institutions) in other countries in Latin America (Argentina, Uruguay, Cuba, Guatemala), Asia (Vietnam, Indonesia) and Africa (Angola, Mozambique).

- A couple of them are already retired, but are still working as "Senior Professors" advising students and helping in projects. They have had as well positions as directors of the school of forest engineering at the UFPR.

- Few are indeed alumina from the very School of Forests where they work today as professors.

- "The item 'trust and dialogue... at virtual environments' depends on the literacy and intimacy with the tool / media".

- One said: "**It depends on the size of your soul**", relating to the attitudes of professors when collaborating without direct interests for their careers. This same professor believes that "**we are becoming more bureaucratic**". In his opinion, what is missing for the improvement of collaboration at his academic environment is "**a combination between resources and incentives**".

- Another professor (a woman!) happen to be the Coordinator of Research and Development of Science and Technology at the Federal University of Paraná. She is also consultant or member of boards in other public institutions at the national level (Capes, CNPq and Finep).

- Another professor, working for a public company, said that "the core problem at Embrapa is the limitation of the number workers, and consequently the lack of time of its team. Indeed, bureaucracy is a must at Embrapa, what represents a great deception, since it demands a lot of time. **The difficult part with the digital media is to build the network among people, afterwards the use of any tool to communicate is not that problematic. It means, the barrier is still on persons, not on the machines or systems.**"

IN-DEPTH QUESTION (Institutional Policy)

Please, explain how the main barriers / impediments for the full development of scientific collaboration operate in your department... What is missing for the full development of a collaborative work on research... What is missing to promote the improvement of scientific collaboration... Some expected options were:

* Institutional policy
* Cultural change
* Information organization
* Information services / structure at my institute
* Knowledge access and transference
* Content qualification and eligibility
* Financial support
* Technological literacy
* Better software tools
* Lack of awareness for comunication issues
* Problems of administrative / institutional structure
* Lack of trust

Please explain a bit each of your choices...

ANSWERS:

- Competition (**competitive edge**) is what make us better.... without competition we might stagnate.
- We are adults, a person must to know how to defend himself and to pursue his own objectives... (1st Interview, Marisa)

- The public university is very slow on mobilizing resources, specially for research... and this is a great bottle neck to the research effort of our staff... in many cases professors are paying the ink of their printouts by themselves... On the other hand they don't care where or with whom you publish your research, and there is no specific policy regarding this... exception that you should try to publish a minimum number of articles per year and in a well ranked publication...
- Concorrência tem dois sentidos: **punitive** and **rewarding**. If you have no concurrence, if the effort has no parameter when being rewarded, than everyone tends to be leveraged by the less effort... **it becomes a disincentive**...
- At the public university there is a policy of disincentive of the work of research... in one hand due to the bureaucratic and limiting approach on funding resources... sometimes, the only way to do a research project is with the money of a private company. (2nd Interview, Joao G.)

- **I am very competitive**. I do not trust anyone even face to face, imagine through virtual communication tools...
- **The main problem is the structure of the institution**. It is not very logic. The root of the problem is that we are professors of the undergraduate program... we are employees of the university to teach on bachelor courses... to teach on graduate courses is in fact a volunteer work, we do not receive any salary for it. On the other hand, it gives you all necessary freedom to build your career as you wish. The only concrete evaluation parameter that we have at the UFPR is the number of hours you teach in the week... **the research is the last priority on this context**... you do it if you want... though we need more pressure mechanisms to motivate professors to work properly on research... I mean it is needed a specific policy for research, but what we have is a policy for teaching that includes some requirements regarding research work... (3rd. Interview, Daniela B.)

- If you would send these questions per E-mail to me, would probably never answer them... this is a real cultural barrier to the application of digital tools for academic communication.
- Concurrence is not a real limitation.. who really wants to do, do it...

- **There is a kind of inertia regarding specially a lack of time** to spend in trying out new things... there are already well established tasks that a professor and a researcher has to perform.. and this causes a lack of time for other new things (innovation**)**. (4th. Interview, Antonio Higa)

- The **lack of incentives (funding, policy**) is the most relevant problem for collaboration... there is no specific norms or rules (ranking) towards cooperative work... (5th. Interview, Julio Arce)

- Concurrence spirit is in principle positive... it is a stimulus, but should not be exaggerated. **I think the lack of a policy towards collaboration and communication is the bigger problem** for the academic establishment world wide... (6th. Interview, Ivan Crespo)

- Today a good reference regarding the reliability or credibility of a scientist or author is the Curriculo Lattes. There you may find information that support an assessment about the work of a researcher or professor. **If you have no CL, you are an outsider**. It means, you are not an academic.
- **The lack of resources is the biggest barrier** for Brazilian scientists. I am a guy of the research work, and the most part of the research done in the country is done by public universities, where exactly there is a huge demand for resources. (7th. Interview, Sebastião Machado)

- **Dialogue and good will** are the main problems for collaboration and a better (more efficient) communication process.. and **the lack of time is the root of this lack of dialogue**... (8th. Interview, Márcio Rocha)

- The greatest barrier is the **lack of resources** in combination with **bureaucracy** for the liberation of resources... sometimes we have to take money from our own salary to pay travel costs, ink for printers etc that are needed to research activities... (9th. Interview, Romano)

- I believe that the freedom is very important, but what we are missing mostly is an **institutional guidance**, in a sense of what is our mission here in this institution... we need urgently stimulus to define the priority on my field work, and not my own priority... also **stimulus to work together**, to share our discoveries aiming to improve the science itself, and not only the conditions of my individual work... there is no directive in that regard, when you get here the main message you receive is "every man for himself and you take care of your own"....(10th. Interview, Carlos Roberto Sanqueta)

- (PUBLISHING NORMS) - Some requirements of the department publishing's norms, for instance format of the text, graphic disposition and indexation aren't offered by most of the bibliographic tools. Since the requirements go into the most insignificant details (e.g. subtitle must have the first letter in capital and bold). This results that the **authors prefer to work with more conventional tools (e.g. Word editor**) because there they are more familiar with the features available and also they have **a better control of the process**. It means, that people, specially the older ones, are afraid that once they get used to apply automated tools for bibliographic management, they won't be able to work without them afterwords. They make us addicted. I prefer to do the layout of my articles manually, because in this way I have a better control of the process and I can my self correct any mistake that appears.
- Authorship is a complex issue. Many people take advantage of the norms of the system. And **the current system has been unable to evaluate the real relevance of a research work** to the science itself and to the society. The current system lacks means to assess the real importance and applicability of a research work.
- **The biggest problem to us nowadays is regarding the time needed between the submission of an article and its publications**. The average is now around two years of

waiting until you get a text published in one of our better ranked publications. This is a real problem to the advancement of science. And you can not submit or publish the same article anywhere else. It is a **term of exclusivity**. You are not allowed to release publicly the same information you are using in an article submitted to a publication that it is fundamental to your career. (11th. Interview, Alexandre F. Tetto)

- I am a bit different of the rest of the staff. I am not a political being. And in my opinion **the biggest problem here is political**. It means, if you are not a communicative and active person in contacting and talking to other people (suck ups) you have much more difficulty to get support or resources. But if you are a "good politician" in that regard you will get things much easier. This results that people with much more experience and competence do not get the support and resources as other people, that are not so good in the scientific activity, but are very competent in promoting their interests through the good contact with others. Less political people get less, more political people get more. A chief of department is a political position, and this creates a context in which the rest of the staff becomes extremely dependent of his good will to get things they need to improve their work. (12nd. Interview, Antonio Carlos Nogueira)

- There is no environment with a degree of **freedom**, and at the same time with a degree of **vanity** as the academic environment. And people confuse this many times, since you can say what you really think, but even though you have to follow a script dictated by the rules of the institution you belong to. In other words, people here end up using the rules and the freedom they have to promote their own interests, as they would have a divine mandate to pursue almost exclusively their own interests, which is usually related to their egos.
- Competition in a private company is a good thing, a motivational aspect of your work. But **in a public university this same spirit of concurrence is counter-productive, since you are not working to achieve any individual goal.**
- Indeed it is **a sum of factors**. **Infra-structure** is one thing. Other is a **lack of incentives** to promote collaboration specifically. And also a **disconnection between institutional policy and individual interests** of academics. Thus, you see people with an outstanding talent and interest to teach classes, but with no inclination to do research. And vice-versa. At the same time the current system of academic administration puts every body in the same boat, **without any difference of assessment or reward**. The current structure homogenized all of us, although we are indeed very different from each other. From the point of view of capacity, skill and interest. We should have a more flexible form of manage, evaluate and reward our work. In summary, today every one does every thing, and no one charges the performance of nobody. **The reward system is more worried to attend the demands of managing the system than to give conditions to improve the work done by academics**. In practice, if you work better and more efficiently, your reward will be more work. (13rd. Interview, Nilton José de Sousa)

- Our repository of thesis and dissertations is very good. But it is a reliable source for works from 2000 until now. If you need to check older stuff it is better to consult the physical archive. Today we have a phenomena I called the **"chain of citations"**. Not rare it is a hard work to find the primary source of a citation, and the systems we have currently do not facilitate that. To see who was the first person to use certain information you must combine both, **physical and virtual archives**.
- There is no open discussions about scientific works here in our corridors. There are closed groups that only share information among themselves, but do not share their data or information with other colleagues from other fields or area of interest. It is a kind of **protective attitude**.
- We are here divided in feuds, and **we do not compete directly, but do not cooperate** at the

same time.
- The main problem here is this issue between **individual, egoistic interests and collective, common good**. Everyone is acting to solve his own problems, or to attend his own interests (14th. Interview, Rui A. Maggi)

- We are still very dependent on personal interaction to trust another person. But the main problem is **the lack of motivation to collaborate properly** with someone in a scientific enterprise. **We have no direct incentives to work together**. Besides that we are immersed in a **very individualistic context**, where everyone is taking care of his own problems and interests.
- I would also say that we have no structure or directive dedicate exclusively to research. **Every research activity is mixed with some teaching obligation.** And this make our research goals a derivative goal of teaching. Teaching is the first priority here. (15th. Interview, Nelson Carlos Rosot)

- The academic communication is in general much better than in the past. But I believe it could be further improved through a better interaction between professors and students, specially during the lectures. For example, if students could be responsible for taking care of the academic communication. This could represent a great evolution of collaboration in the scientific context. And this is not a matter of using a different technology, it requires a **shift in mentality**. (16th. Interview, Sylvio Pellico)

- **I don't see anything that should be improved in my academic production**. (17th. Interview, Setsuo Iwakiri)

- For us what is the main thing missing is **an environment conducive to collaboration**... it could be achieved through a policy to incentive specifically the work of research... a better institutional direction regarding this specific activity. The persons today they assume this role as researchers because they must, since they are obliged to, since it is a mandatory requirement of any federal university. But many of them are talented or motivated only for teaching activities. (18th. Interview, Franklin Galvão)

- I think the main bottle neck to improve our collaborative work is **more directed support and resources, specially human resources.** Usually we do not have persons here specifically taking care of issues related to communication. Usually you allocate persons from other roles and activities to perform fundamental activities regarding communication. (19th. Interview, Christel Lingnau)

- It is very probable that if we had some initiatives, or exercises intending to strength our spirit of team, our notion that we work collectively, we would see many improvements in our work... a **spirit prioritizing sharing, instead of ownership**... an effort to consolidate our relations as a whole, and not as individuals... **It is a compromise to build a real network inside here, and not only a virtual web with puerile and superficial relations all over the world**...(20th. Interview, Vitor A. Hoeflich)

- The system aims to evaluate your output from a quantitative point of view... this contradicts the concern with quality.... it is natural, since we do not have any objective means to deal with the quality of our work.... but **I don't know what could be done to change this**...(21st. Interview, José Guilherme Prata)

- He works almost alone in an interdisciplinary field (management of watersheds)...
- Our institutions nowadays work with the idea of **"knowledge dominance"**, and not with the principle of knowledge sharing or collectivization of knowledge... it is a competitive standard... among individuals and institutions. this creates an entire set of behaviours

accordingly, including the principle of competition which generates an attitude of secrecy towards data and information... **the policy regarding research evaluation in Brazil nowadays reinforces this obsession for a competitive edge, it does not try to change this vicious circle**... it is a philosophical matter, but it has a huge impact on how we work and are used to relate to each other. **We miss a policy guideline to counter the current academic culture** (He was dean of research and Post Graduation at the UFPR and was manager of research policy and funding of the Paraná State for 5 years) (22nd. Interview, Nivaldo Rizzi)

- Many people here use the university to become famous, or to get opportunities to make money. It is in fact an internal issue regarding **institutional policy**. One of the best things that happened when I retired was that from this day on I was not required to attend the departmental meetings in order to discuss such matter any more... It means, I became more free to dedicate my effort to my scientific research....
- When I retired 11 years ago, I planned to leave another person in my place. Someone with similar background as mine, someone capable of differentiate plants, herbs, forests etc... But, when it came to the selection process of this person, it became clear that it was a process heavily charged with political and administrative interests. At the end I was replaced by someone who was the preferred of the director of the school at this time, but without knowledge about the work I and my other colleagues had been developing for years here. In other words, there was **no focus on continuity of scientific work.** It is simply a matter of political power, bureaucracy and personal preference... We are a small world of the political context in Brazil....
- The big problem is **the lack of people** available to carry all projects we already have... and every year professors "invent" new projects and topics, in other words, we are amplifying / increasing the structural fragility of our efforts... It is also related to a policy regarding the work on teams... The entire bureaucratic and administrative systems works regarding primarily the individual interests of each worker. No one is assigned to work exclusively or primarily within teams. **Individualism rules**.. It is the ideology of every man for himself. (23rd. Interview, Yoshiko Saito Kuniyoshi)

- He got the green light to start his retirement process... After 33 years dedicated exclusively to the UFPR... I am reducing my rhythm... I am not going to congresses, and I am not starting new projects... the only activity that I am still very active is in advisement of graduate students, what is also convenient for me because of the requirements from CAPES regarding publishing of papers.
- **We do not have resources for research**... we have to search and find these resources with private or public partners, but the university itself do not gives you anything... from paper to copy machines until coffee or sugar... I am and always was involved in searching and getting these extra-resources...
- In my field (plant morphology) most of my sources and resources are local. Very rare you may find something about the vegetation in Southern Brazil on international centers of research... the same for methodology... Brazil is a different country... and we lack exactly that **a framework to attend our local needs**, respecting the characteristics of our local context...
- **academicism** is a problem, since people try to impress others with quantitative records (the size of bibliography, for instance), or with a very complex explanation... and I believe that **the role of science should be to demythologize expert knowledge**.... scientific text should be simple, short, direct and objective.
- Also, today one of the big challenges we face is the coordination of multidisciplinary works... **we don't have the culture, neither the infrastructure** for it...
- But I don't know what is the main barrier for collaboration or co-authorship... it is happening... three or four people want to do something, it happen... everything is relative, but

I thing the issue regarding a better collaboration is related to individual interests... in our current context everything can happen... everything is possible in our country.
- An important issue is regarding the technological revolution.. **i am a transitional generation**... and the changes from now will come faster and faster... (24th. Interview, Carlos Velozzo Roderjan)

- The scientific information is not yet pre-processed before it is distributed... we are still lacking a system where the information of an article would be previously evaluated and classified according to the quality and relevance of its content...
- The main bottleneck that we have in our field is the **very reduced number of qualified publications**... there is a kind of market reserve regarding this... ...a scientist in other field, biochemistry, for instance, has much more opportunity to publish articles in an international publication (English), that is invariably better ranked than our national publications... This extends the buffer time between submission and publication... I have articles submitted that are since three years awaiting to be published... and this happen specially when you submit your work to international, and well ranked journals... A change could be the reclassification of national publications in our fields... specially with respect to the characteristics of each field and publishing culture...
- To publish an article in a publication, this publication must have a grade of B5 (10 points), at least... The Data Capes, is the report we submit annually with the production and evaluation of our work (professors and students) of the graduate program... the main factor is still **the publication on well ranked journals... this is the main criteria... this specific number defines, for instance, the number of students a professor can advise in a graduate program.**.. every year, for at least three years, a professor has to have an evaluation of at least 100 points... we are already having problems with this quantitative criteria, but we have to push it forward or conform that the Capes will reduce the grade of the entire program... for instance the graduate program at the Cifloma was ranked as a program grade 5 (1-7)... in 2011 we lost one position, and became a program grade 4, and this occurred because that several of our professors do not follow this norm of minimal number of articles published in well ranked publications... it is our current main criteria, a quantitative one, for productivity...**This kind of policy generates the following discrepancy**: the Cifloma has 220 graduate students, from master and doctoral level. These, 130 have scholarships, some of them are working in research projects with other universities in USA, Canada, Australia, Europe, Asia, Africa... in many factors we are bigger than some small universities, but from the point of view of our quantitative output, according to the criteria established by Capes, we are still presenting a poor performance.. (Prof. Batista was at the time the head of the graduate program)... (25th Interview, Antônio Carlos Batista)

- In a single area, we have different expertise, what I may call interdisciplinary, and in this single area the different kinds experts do not correspond among each other... **each one is closed in his own "world"**... it is about my "discipline", my project, my research, my ideas, my funding, my name etc... and this kind of perspective **(individualistic)** promote a separation and competition, instead of collaboration... some times is easier to work with someone in another country than with people that work on the same floor as you...
- Our bureaucracy is too much plastered, inflexible...
- **Concurrence is healthy**, it is what makes you to want more, to search further, to be constantly motivated to keep learning...
- The only way to change our culture is to change the people... **we are immersed in a individualistic culture, and I don't believe that any institution could change this.**.. It is like this all over the world... this individualism impede the collaboration to happen in a more

efficient and productive fashion.. this individualism shapes all relationships we establish among us... and they do not admit it, when you ask them directly, but you observe, or try to do it in practice you are going to see the many barriers that appear from this basic principle... (26th. Interview, Ricardo Jorge Klitzke)

- the **"rain of egos"** is too big at academic environments, therefore the competition that happens here is far from healthy... **our culture** should strive and promote more cooperation rather than competition...
- Any initiative of collaboration, even if failed, brings some progress and advancement... (27th. Interview, Anselmo Chaves Neto)

- **The lack of a spirit of unity** is the main problem.. together with envy and mediocrity... some scientists do not want you to advance in your research efforts because your success would overshadow theirs...
- We lack a good professional to take care of our academic and institutional (internal and external) communication... but I know that to have this professional here it would require a huge administrative and bureaucratic effort... alone that would represent a revolution in our institutional culture...(28th. Interview, Renato)

- Although we are a big institute, with over 50 professors, it is clear to any one here that we do not communicate properly among each other.... **there is little and precarious internal communication among professors at the Cifloma**...
- **We lack incentives, specially financial support, to work on research**... all computers in my laboratory I bought by my self, if not with my own money, with the money I got with cooperation projects with private companies...(29th. Interview, Ricardo Anselmo Malinovski)

- We lack an institutional policy seeking to **increase dialogue**... to bring people closer, and to help reducing the barriers among each other... we lack **motivation mechanisms for that purpose nowadays**...(30th. Interview, Carlos Eduardo Camargo de Albuquerque)

- I am still very disappointed the way the research and innovation is conducted inside the public university in Brazil. And the way it is today, the researchers are publishing merely to make numbers on their curriculum, to attend bureaucratic requirements of productivity, **without almost any compromise with scientific advancement.**
- Everyone takes care of his own interests. **And a context with resource scarcity, competition and individualism generates a division of efforts and a mistrust attitude among each other.** It is therefore a culture of the entire academic system. Most of people work only with focus on their private interests, and the institutional regulation reinforces this culture. **We are culturally deteriorated**. (31st. Interview, João Carlos Moreschi)

- We are in a **context here made up by clusters**... If you do not belong to any one of the closed groups you end up excluded completely from the institute...
- There is a pressure upon the institution to qualify the graduate program, although this pressure is mainly based on productivity (nr. of published articles), what generates a series of abnormalities...
- Therefore we should fight corporatism and improve the criteria to assess academic work. (32nd. Interview, William)

- **Time is the core problem**. We cannot dedicate ourselves to research exclusively. Everyone here has to divide his time in many activities, most of them mandatory to the institutional assessment system. **People here doing research of high level are doing it at their own risk and interest, since the institution does not offer incentives for top research activities or engagement**. They work on research, when it is research in fact, **for idealism**. There is no policy, therefore there is no reward from the university. **Scientific research is not priority**. And this explains the lack of resources for investigation and research. If you want to

investigate anything you must prepare a project, search for possible sources of funding and apply for it. The core budget of the university in Brazil has no resource for scientific research. **Therefore there is no administrative support.** Imagine if you want to import any equipment to develop a study... it will be a bureaucratic nightmare, because of this **lack of appropriate infra-structure directed to research.** (33rd Interview, Afonso Figueredo Filho)

- Professors in general demonstrate a very low degree of awareness for communication issues and problems. It is as if many issues regarding communication were located on subconscious or even unconscious levels of their thoughts.
- **The problem of distribution of resources is the most difficult and sensitive nowadays**. The biggest part of funding for high education in Brazil is allocated on already well established institutions. What in one side reflects their merit, but on the other point of view impede or disrupt the development of new research areas or perspectives. And the **merit today is fundamentally based on quantitative indicators**, and there is no alternative to assess the real quality of academic work. (34th. Interview, Simone Morrone)

- **There is no policy regarding any support towards collaboration**... on the opposite... Public institutions compete (Embrapa x UFPR) against each other on a form of institutional concurrence...
- At our environment what rules is the law of **"save yourself if you can"**... or "**every man for himself**"... weirdly enough on the public institutions it is exacerbated... I think the root lies on the pecuniary reward of these workers... **specially the progressive devaluation of the teacher's salary of public universities**... through the years and without a clear policy for the adjustment of wages, the real income of professors and workers at public universities has fallen... besides that, **there is no policy regarding the investments on research, and specially the assessment of the quality of these researches**... it is to say that although a professor has to publish articles in order to be accredited for teaching in a graduate program, there is no policy regarding the research work itself... it is an activity every professor has to performance in parallel with the main task of teaching... but if **he dedicate himself to top quality research he does not receive any reward (pecuniary or of career progression) for this effort and initiative**... and at the end the lack of any qualitative parameter for research assessment justify this entire system... Where professors are doing consultancy for private companies using the intermediation of public foundations installed inside public universities like our Fupef... and at the end they call this work as "scientific research", but indeed they were doing consultancy... and all of this happens because professors have to search for ways to increase their income, since the government has washed his hands on this... **The system as it is is shaping professors professional behavior**...
- We lack a clear policy regarding assessment and incentive of research... professors are searching for any form to increase their income, they are selling consultancy as scientific research in order to attend the rules of the institution, but at the same time they want to improve their economic situation... and **the government is encouraging this kind of situation, where the university pays the basic salary, and any complement must come from outside, specially from private companies**... This generate a series of discrepancies, specially the fact that **it represents a form of privatization of the public investment**, since the companies do not pay for the infrastructure of the public university, neither for the salary of the professors engaged on these customized investigations... and also when the results of these researches are to be directly transferred to the companies, without any compromise to make the knowledge produced publicly available... on the opposite, not rare there are the secrecy terms on the contracts between companies and the foundations responsible for receiving and managing this money...

- He was the chef of the graduate program, and he is still acting as Deputy head of the department of Forestry Engineering at the Cifloma...(35th. Interview, Ricardo Berger)

- I was member of CNPq for many years, I was consultant at Capes for 13 years... and I followed the development of the graduate program from its very beginning... while we were doing our masters and doctors courses outside here, including many countries, we managed to keep a diversity of ideas in a cooperative manner, since the professors were formed in many different places, with different perspectives and focuses, therefore little reasons for competing... but when we started to offer the graduate courses here, it started an autophagy process... with students with the same curriculum and formation disputing spaces and positions among each other... It means that students were attracted to pursue under-graduation, graduation and post-graduation in a single environment, which **turns to reproduce and motivate competition among colleagues**... this was the biggest mistake we did...
- The spirit of concurrence is anomalous nowadays... the endogenous concurrence (people graduate and post graduate in the same department) is producing an autophagic effect... we must promote **a degree of dependency among researchers**, to a certain extent that academics understand that they practically depend on each other to make science to advance...
- also the standardization is a problem... and this is an effect of massification, which inevitably produces standardization, and this conduces to a endogenous process, which ends up in autophagy...
- Ideas are the most important product to any scientist, and this is why philosophy is still important to any science nowadays...
Tabela com número de dissertações e teses concluídas por orientador na história do programa (atualizada em 05/09/2002).
Até a data de atualização o Programa titulou 352 Mestres e 136 Doutores (total de 487 titulados). O professor Roberto Tuyoshi Hosokawa com 38 teses e dissertaçoes orientadas é o primeiro da lista, seguido pelos professores Mário Takao Inoue (com 28) e Sebastião do Amaral Machado (com 23).(36th Interview, Roberto T. Hosokawa)

- The great bottle neck at academic environments all over the world **is cultural**... it is related to the people's attitude... competition in any academic context ends up presenting very harsh effects for the development of scientific research... The solution would require a mix of tactics, but one of the decisive would work as a kind of **system supporting leadership demanding a change of attitude and behaviour**...(37th. Interview, Ivan Tomaselli)

- I think the most urgent problem is the form our work is being evaluated... **It is very problematic this assumption that quantity, in any regard, can represent quality, much more creativity, which could be considered a basis for innovation and discovery**... It is a system that restricts the researcher in many forms... Specially, it does not motivate any one to pursue a really scientific goal... to improve knowledge... it is a system based exclusively on the quantity of articles written, or citations etc, with **no connection to the object of research itself**... the current system indeed constraints the scientific performance of the scientist to mere bureaucratic and administrative measurements and actions...But the problem has two faces, one is regarding **institutional policy**, the academy as a whole, the way research and science have been managed... and the second is a **cultural** issue, regarding **the behaviour of academics in social contexts**...
- Communication always present a bias... the first bias relates to the interests and perspectives of the author.. he always want to defend a specific point of view.
- Today our assessment and publishing system is quite plastered. Specially considering the possibilities for information distribution offered by the new media. We are tied to a

punctuation system that practically only take into consideration the publication of articles in well ranked journals (index Qualis). This kind of parameter hampers the communication, for various reasons. First, **it motivates researchers to pursue the publication on a very limited number of journals**, which every student or professor seek as the main goal of their work, **increasing a malefic form of competition**... among the side effects we may cite **the accumulation of papers to be published by only a few number of journals**, causing a very significant delay in the release of the information to the public... And at the end, these very publications have a restricted public, which restrict the circulation of the information produced by our best scientists... including outside academia... The scientist should also seek contact with the outside world.. including in other areas of his knowledge domain... but any effort in this sense is boycotted by the system of assessment, because it does not consider important works for an academic like lectures, seminars, and the publication of any other format than papers, like books for example... to publish a book counts almost nothing for your career progression... This promote a very harmful attitude toward the pure objectives of scientific investigations.

- Two pernicious factors:

1) the obsession to publish anything in papers, because it is decisive to career progression;
2) the situation of misery of the researcher, which means the lack of financial support to scientific investigation in general.

- Regarding the second factor, it operates nowadays basically through scholarships given by CNPq. Which is a very low (400 Dollars per month) resource that ties the researcher to an inadequate assessment system... which for instance, **does not give any reward to an academic who reviews articles to be published in a journal.**..
- We lack a communication policy intending to improve the dissemination of scientific information...
- He is head of the department of Forest Engineering...(38th. Interview, Dimas Agostinho da Silva)

- It is a matter of interests... you must have personal affinity to the persons you are expected to work with, but with my experience here it became an impossible goal for me... at the end **you work only with those persons you are confident with, and this general habit produces clusters inside any institution, where certain groups of people are used to work together only among themselves**... unknown people have difficulties to come closer and take part in projects being developed by these clusters...
- It is also a cultural component promoting distrust among people.. it is a side effect of the competitiveness aspect inherent of any activity in a capitalist society...
- we are not taught to work in teams, not before, not during, and not after the study at a university... as if it would not be important to our very educational institutions... a prove of it is that if you ask anyone here, you will see that nobody knows the works other colleagues are carrying out currently... **which projects and investigations the Cifloma, as institution is pursuing**.
- There is also a gender factor, since the great majority of professors are men... and they get together on week end, and develop different activities rather than only academic work... they socialize much more among them, but this is impossible to do for a woman alone... **it is a greater degree of separation... between men and women.**..
- But there is no resource to work out such kind of problems... **it is not the priority of the institution**...
- She was Head of the Department for 3 years... during this period she had to stopped her research projects and stopped publishing for one year, causing her exclusion of the graduate program...(39th. Interview, Ghislaine Miranda Bonduelle)

- **Lack of resources** (funding and infra-structure) for collaborative research work...(40th. Interview, Ronaldo Viana Soares)

- Our biggest problem is **the way we act as scientists**... we allowed the institution to attribute to us way too many tasks (administrative, guidance, bureaucratic) that have little, or nothing to do with academic and scientific issues... **in certain cases we are seduced to act like this, in other cases we are obliged by the institution, but in any case we almost never react regarding the form and direction of these policies and rules**...
- You have to consider, that with time you become more mature, what means that you loose, even if only a bit, your motivation to fight for change.. in any situation in your life... you loose the hope to get anything different, then **the only way is to conform**...
- The institution should offer the appropriate resources to exchange information, data, knowledge and even ideas... this towards **an integrative effort**... today, when the university offers something like this, it offer with competitive intentions, and never with pure collaborative goals... the university should become an environment appropriated to any sharing effort... **it should reward only efforts in this direction**, what indeed never happens nowadays... UFPR has 1800 doctors, but not a single policy or action to bring these people together... what we really need at first is **a good ambient for collaboration**...
- Competitive environments tend to promote the isolation, seeking individualization of the benefits of your effort...
- He has a background in chemistry and technological innovation...(41st. Interview, Umberto Klock)

- **The competitive aspect of scientific work depends on the size of your soul**... certain people simply get satisfied to see the success of others, but there are those who take the success of others as a demonstration or confirmation of their own failure...
- What is indeed needed is a personal effort to identify the potential partnership in the others, this according to interests, world view, and personal affinity... in other words, **what is missing is a mood towards collaboration**... what includes first the individual disposition and action, but also an institutional support and incentive... (42nd. Interview, Alessandro Camargo Angelo)

- The most relevant sins of science are all related to the subjective character of the scientist's personality... vanity, pride, jealousy, envy etc, are the kind of feeling promoting disintegration of the scientific effort, specially in a context where you have mechanisms like academic rankings, productivity indexes, patents and other intellectual property means that add a financial or economic interest... the logic in such a context is more collaborators you have, less will be the quote value of the discovery distributed to each participant... in my point of view **the financial interest represented by the current patents system is a great barrier to the development of a more collaborative academic effort**... (43rd. Interview, Celso Garcia Auer)

- We need more resource and incentives to work collaboratively... what includes forms of work organization that inhibit behaviour or attempts to harm other colleagues interests for issues of vanity or fear to loose influence or power...(44th. Interview, Nelson Yoshihiro Nakajima)

- This is a cultural issue... I think the main problem can be explained only through the history... science has become a mere technicist activity, where the scientists started to trust too much the technology that is helping them, and became dazzled by the possibility of such knowledge, but at the same time **they forgot the essence of their own knowledge**... in many cases you can meet scientists who can not explain how basics mechanisms of their area

work... usually they have just nice suppositions, but they ignore the origins of such tales... They can know the results of certain combination of data and parameters, but they are not able to solve intrinsic problems on their own domain...
- Institutionally we are going in the direction of assessing results, and that is it... I believe in a certain moment we are going to be evaluated according to the number of patents your research generated, or how many jobs it created, or how much money it is worth of... it is **the university company**... this is what is happening with college education all over the world, it is being incorporated by the economic imperatives...
- What is missing is shame on the face... **It is the will to do things correctly**, instead of always trying to use the infra structure around for private interests... Humility is a great remedy against ego oriented personalities... (45th. Interview, Graciela Ines Bolzon de Muniz)

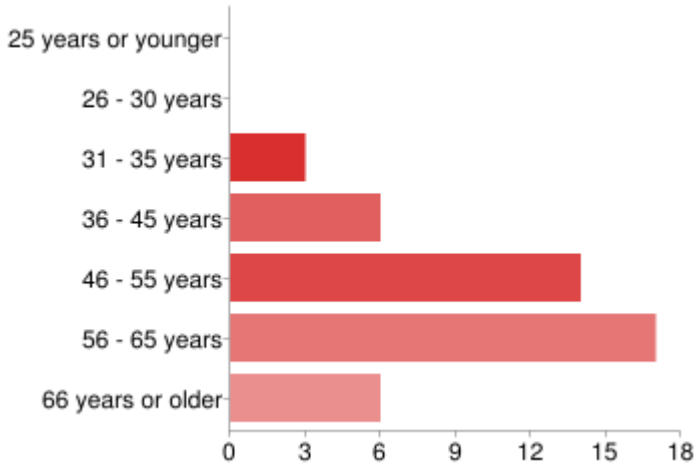
9.4.3 General & Academic Profile

This part of the survey will guide the analysis of the data, allowing the visualization of differences and similarities among fellows, specially according to age, gender, background and field of work. The information will be managed carefully in order to preserve the privacy and anonymity of the participants.

Gender

Male	39	85%
Female	7	15%

Age



25 years or younger	0	0%
26 - 30 years	0	0%
31 - 35 years	3	7%
36 - 45 years	6	13%
46 - 55 years	14	30%
56 - 65 years	17	37%
66 years or older	6	13%

Position / Activities

Consultant	29	63%
Librarian	0	0%
Manager / Administrator	24	52%
Post-Doc	2	4%
Professor	45	98%
Researcher	46	100%
Other	5	11%

People may select more than one checkbox, so percentages may add up to more than 100%.

Institution Type

Public university / Research institute	46	100%
Private university / Research institute	3	7%
NGO / Non for Profit Organization	6	13%
Private company	12	26%
Public company	11	24%
Mixed institution	10	22%
Other	0	0%

People may select more than one checkbox, so percentages may add up to more than 100%.

Which institution requires most of your time?

24 Interviewees declared to be exclusively dedicated to the Public University.

Field of Study

Agronomy	2	4%
Atmospheric studies	1	2%

Biology	4	9%
Carbon sequestration modelling	2	4%
Ecological modeling	2	4%
Environmental education	3	7%
Entomology	2	4%
Forest engineering	30	65%
Forestry	13	28%
Geoinformatics	3	7%
Geology	2	4%
Hidrology	2	4%
Interdisciplinary studies	1	2%
Landscape ecology	2	4%
Nature conservation	9	20%
Soil dynamics	2	4%
Sustainable development	2	4%
Other	48	104%

People may select more than one checkbox, so percentages may add up to more than 100%.

Other background than the field of study

Anthropology	1	3%
Architecture	1	3%
Chemistry	10	31%
Communication	0	0%
Computer sciences	4	13%
Economy	6	19%
Engeneering	7	22%
Geography	0	0%
History	1	3%
Library and Information sciences	0	0%
Management	4	13%
Mathematics	9	28%
Physics	5	16%
Sociology	3	9%
Other	27	84%

People may select more than one checkbox, so percentages may add up to more than 100%.

International Experience

No, I never worked or studied outside my country.	12	26%
Yes, on undergraduate course	2	4%
Yes, for my master studies	7	15%
Yes, for my doctor research	14	30%
Yes, at a postdoc level	13	28%
Yes, as a professional or tecnician	7	15%
Other	11	24%

People may select more than one checkbox, so percentages may add up to more than 100%.

9.4.4 Trial Interviews and surveys

(IN-DEPTH QUESTIONS) Trial interview applied to a 30 years old student on the 5th. year of Economics at an University also in the State of Paraná (University of Maringa)

- What are the main motivations / reasons behind the choice of certain communication tools / procedures at academic environments? Give examples according to the answers from the survey... for instance: Do you have your own page or blog? Is there any offer from your academic institution in that regard?

* Habits from home; -The influence of colleagues; - No offer from the university regarding the use of communication tools, or even any discussion about the improvement of the academic communication. (30 years old student on the 5th. year of Economics at an University also in the State of Paraná (University of Maringa))

- How publishing scientific texts / papers contributes to your academic career? Is there any different impact within co-authored publications? Explain, give examples... How are co-authored and single authored texts valued

/ counted?

* No opinion about this. The production of texts is simply a mandatory requirement of my academic activity. (30 years old student on the 5th. year of Economics at an University also in the State of Paraná (University of Maringa))

- Are there certain journals in your field that count more for promotion and tenure? Therefore, what is your perception of the "open access" publishing phenomena? Does it offer extra incentives for collaboration via Internet? How? Have you published works under open access licensing? Why?

* Also no opinion about, just that I would like to have more incentives to publish, does not mattering where. (30 years old student on the 5th. year of Economics at an University also in the State of Paraná (University of Maringa))

- Therefore, what are the current motivations for you to write articles together (in collaboration) with other fellows? Possible answers: decrease conflicts of interest; to get it easier; expert knowledge interaction; improve career records; improve institutional ranking; improve the visibility of own work; access special fundings opportunities.

* In some disciplines it is mandatory to work together with other colleagues. In others it is required to present a report written alone. And in others, you can choose to work in group or alone. Usually it is easier to work together, since you can divide the tasks with other colleagues, but this is not a collaboration by definition. It is in fact more a division of tasks, than working together. (30 years old student on the 5th. year of Economics at an University also in the State of Paraná (University of Maringa))

- Do you have any offer from your department of courses, upgrades, actualizations etc, of new tools for academic networking, research collaboration or co-authoring? Are there institutional incentives to try out alternative tools / methods? Please specify when, what, how and comment the results and benefits...

* No (30 years old student on the 5th. year of Economics at an University also in the State of Paraná (University of Maringa))

- Please, explain how the main barriers / impediments for the full development of scientific collaboration operate in your department...

* The institution seems not to have as its first goal the instruction of the student, but to have means to evaluate apprenticeship with numbers that can produce statistics. (30 years old student on the 5th. year of Economics at an University also in the State of Paraná (University of Maringa))

* The problem today is related to the egocentrism as the core philosophy at the academic environment. “I am.....!” It is a lack of humility, which makes us to amplify our ignorance. We have lost our capacity to relate to each other in order to learn, like the children do. (Graciela Muniz, 58, Coordinator of Research and Development of Science and Technology of the UFPR).

Survey test (08/2009)

Who (male)

MSc. Gustavo H. de Souza Dias, 28 (gustavohsdias@yahoo.com.br)
Doctoral student, Faculty of Agriculture and Horticulture - Humboldt Universität zu Berlin.
Research field: Economic sociology.
Country of origin: Brazil

Answers

* Tools/Activities

He usually applies digital systems for "consulting / searching" information.
For material search and exchange he usually uses "Google Scholar".
For time management he usually uses Google Calender, or a hard copy schedule.
For references gathering he usually applies Google.
For discussions he draws on personal meetings with department fellows and E-mail lists.
For publishing and disseminating his work he uses electronic journals and expert conferences.

* Technology / habits

He never uses collaborative writing (e.g. GoogleDocs), social networking (e.g. Facebook, Ecademy), or e-learning tools (e.g. Blackboard). Also, he uses seldom intranet (e.g. Moodle) and voice/instant messaging (e.g. msn, skype). However, he is familiar with tools like weblogs, wikis, OPACs and Online libraries. Only E-mail is the kind of tool he uses everyday.

According to him the ideal objectives of a collaborative platform for scientific purposes should be:

1) Contact facilitation
2) People interaction
3) Content distribution

4) Institutional cooperation
5) Information organization
6) Content eligibility
7) Knowledge sharing
8) Scientific progress.

He had already have experience with Open Access publishing, and "presently consider the possibility of applying for peer-reviewed electronic jornals. But this mechanism for online review was first introduced to me during this research."

Who (male)

MSc. Napoleon Molina, 29 (molina.napoleon@agrar.hu-berlin.de / napong@hotmail.com)
Doctoral student, Faculty of Agriculture and Horticulture - Humboldt Universität zu Berlin.
Research field: Horticultural Economics.
Country of origin: Honduras

Answers

* Tools/Activities

He usually applies digital systems for "consulting / searching" information (1), then "reading""sharing" (3), then "publishing"(4), then "referencing" (5).
For material search, sharing and exchange he usually uses "E-mail and Intranet".
For time management he usually uses a hard copy of a schedule.
For references gathering he usually applies Intranet and OPAC.

For discussions he draws on Intranet, Social Networks Platforms and Voice Instant Messaging tools.
For publishing and disseminating his work he uses Intranet and E-mail.

* Technology / habits

He **never** uses E-learning Platforms (e.g. Blackboard), and Weblogs.
Also, he uses **seldom** Bookmarking tools (e.g. del.ici.us) and Collaborative Writting (e.g. Google Docs).
However, he **usually** applies Voice/instant Messaging (e.g. skype, msn), Wiki pages (e.g. Wikipedia), OPAC and Open Access Libraries.
E-mail, Social Networking platform (e.g. Facebook) and Intranet (e.g. Moodle) are the kind of tool he uses **everyday**.

According to him the ideal objectives of a collaborative platform for scientific purposes should be:

1) Knowledge sharing
2) Content distribution

3) Institutional cooperation
4) People interaction

He has no experience with Open Access publishing.

Who (male)

Dr. Bockelmann, 56
Professor, Faculty of Agriculture and Horticulture - Humboldt Universität zu Berlin.
Research field: Economics, Value Chains, Marketing.
Country of origin: Germany

Answers

* Tools / Activities

He usually applies digital systems for "reading", "referencing", and "publishing".
For material search, sharing and exchange he usually uses "E-mail and Adobe".
For time management he usually uses Thunderbird's schedule.
For references gathering and management he usually applies Citavi.
For discussions he draws on Personal talks.
For publishing, disseminating and content production he uses Lyx (The document processor).

* Technology / habits

He **never** uses Bookmarking tools (e.g. del.ici.us), Collaborative Writting (e.g. Google Docs), Social Networking platform (e.g. Facebook) and Weblogs.
Also, he uses **seldom** Voice/instant Messaging (e.g. skype, msn), Wiki pages (e.g. Wikipedia) and Open Access Libraries.
However, he **usually** applies E-learning Platforms (e.g. Blackboard), Intranet (e.g. Moodle) and OPAC.
Only E-mail is the kind of tool he uses **everyday**.

According to him the ideal objectives of a collaborative platform for scientific purposes should be:

1) Knowledge sharing
2) Information organization
3) Institutional cooperation
4) People interaction
5) Scientific Progress

He has no experience with Open Access publishing.

Who (Female)

Dr. X, 51
Senior scientist, Institute of Agricultural and Urban Ecological Projects - Humboldt Universität zu Berlin.
Research field: Agro-food business, Food science.
Country of origin: Germany

Answers

* Tools / Activities

She usually applies digital systems for "reading"(1), "referencing"(2), "consulting/searching"(3), "publishing" (4) and "sharing" (5).
For material search, sharing and exchange she usually uses "E-mail".
For time management she usually uses Thunderbird's schedule.
For references gathering she usually applies ISI Web of Knowledge, OPACs, Citavi.
For discussions she draws on Personal talks.
For publishing, disseminating and content production she uses institutional websites on the field.

* Technology / habits

She **never** uses Bookmarking tools (e.g. del.ici.us), and Collaborative Writting (e.g. Google Docs).
Also, she uses **seldom** Voice/instant Messaging (e.g. skype, msn), E-learning Platforms (e.g. Blackboard), and Weblogs.
However, she **usually** applies Intranet (e.g. Moodle), Social Networking platform (e.g. Facebook), Wiki pages (e.g. Wikipedia), Open Access Libraries, and OPAC.
Only E-mail is the kind of tool she uses **everyday**.

According to her the ideal objectives of a collaborative platform for scientific purposes should be:

1) Scientific Progress
2) Content distribution
3) Information organization
4) People interaction

She has no experience with Open Access publishing.

Comments on the questionnaire:

- It is needed at the beginning of the inquiry an objective introduction on the research goals, methods and target group, without forgetting the disclaimer about anonymity and privacy over the personal data and opinion given on the inquiry.
- The options on frequency of use of a tool or service should be measured according to concrete parameters (daily, weekly, monthly....)
- Examples on uses, applications, services and tools are fundamental for the interviewers to verify their understanding over technical terms borrowed from expert fields like communication, information science and informatics.
- "Contact facilitation" and "People interaction" are too close from eachother.

- "Information organization", "Content distribution" and "Knowledge sharing" are, in certain cases, overlapping eachother.
- The experience with Open Access Publishing should have also practical examples in order to facilitate the interpretation and verification of its applicability on the context studied.

Curitiba, 22 de Fevereiro de 2011

Entrevista Prof. Dr. Vitor Afonso Hoeflich (UFPR)

"In undergraduate studies research and publication activities are episodic"... "You should not necessarily be dependent on (qualitative) interviews... The problem is that the people on this field (Forestry), they don't want to be publicly stripped in certain aspects like communication..."

"Publication is a growing institutional demand. But only as a general number (quatity of papers, articles, thesis, citations), where the quality of the content does not matter"...

"The international publication of scientific journals work in the field of forestry like a Mafia. It is virtually impossible for a brazilian researcher to get there."...

"Shortly speaking, everybody is involved in a survival process, and on the other hand the society demand increasingly quantitative results, not because is the best way to evaluate someone's work, but it is the easiest, maybe the only way to evaluate the academic production".

"If a person does not see an advantage for him self in any work or project, he tends to not collaborate with"...

"At the same time, the level of institutional disengagement is already huge"..."internally, the degree of flexibility has been reduced, and therefore students that are working in the daytime never get to meet their professors for consultation or support, since those are normaly available only in the working time of the students that can not afford their studies without a job.